United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Wyoming Agricultural Experiment Station

Soil Survey of Laramie County, Wyoming, Western Part

How to Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

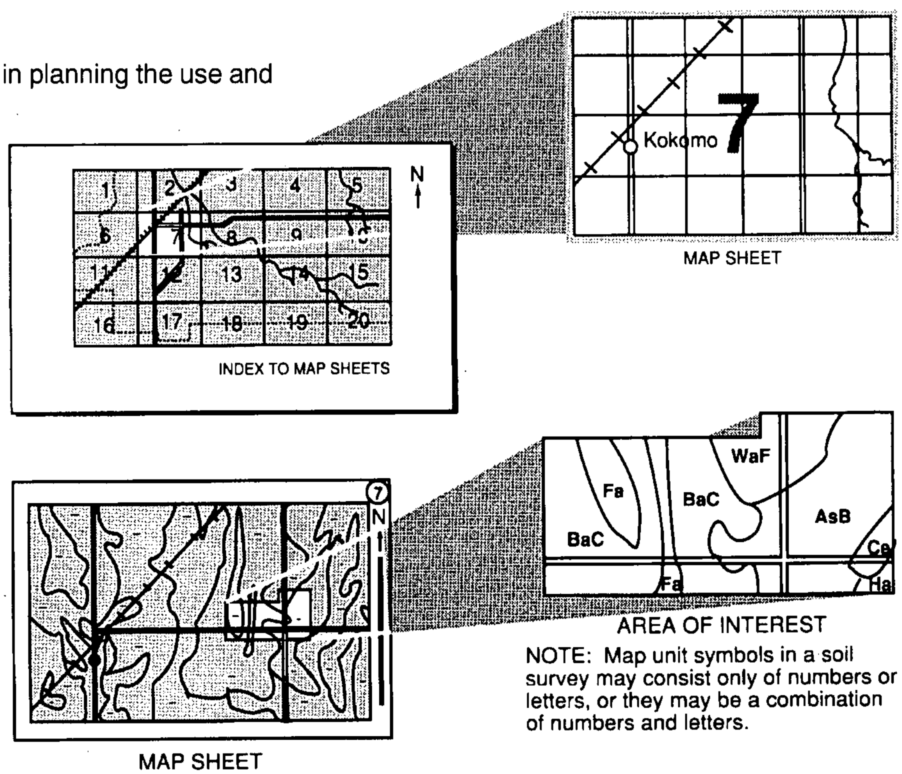
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1993. This survey was made cooperatively by the Natural Resources Conservation Service and the Wyoming Agricultural Experiment Station. It is part of the technical assistance furnished to the Laramie County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: The dominant land use in the survey area is rangeland.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2001

Foreword

This soil survey contains information that can be used in land-planning programs in the western part of Laramie County, Wyoming. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Lincoln E. Burton
State Conservationist
Natural Resources Conservation Service

Soil Survey of Laramie County, Wyoming, Western Part

By Abe Stevenson

Fieldwork by Abe Stevenson, Joe Johnson, J. Allen White, James Daquinta, Mike Lloyd, Ralph Johnson, and Ronald Shalippa

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Wyoming Agricultural Experiment Station

This soil survey covers the western half of Laramie County, Wyoming (fig. 1). The soil survey for the eastern half of Laramie County was published in 1983 (USDA, 1983). Laramie County is in the southeast corner of the state. Cheyenne is the largest city in the county and serves as both State capital and county seat. The survey area covers a total of 1,019,274 acres, or about 1,591 square miles. About 868,634 acres is privately owned; 128,240 acres is State or county owned; and 22,400 acres is federally owned. The survey area is bordered on the north by Platte and Goshen Counties, on the west by Albany County, and on the south by Colorado. The eastern boundary of the survey area occurs at the division between Range 64 West and Range 65 West. The main land use in the survey area is rangeland. A small acreage is used as nonirrigated cropland.

The eastern part of the survey area is characterized by gently undulating terrain typical of plains physiography along with a small number of hills and ridges. The middle part consists of ridges, hills, and valleys on a gradually rising upland. The western part features valleys, foothills, and mountains of the southern Rocky Mountain system. The streams in the survey area are tributaries of the North Platte or South Platte Rivers.

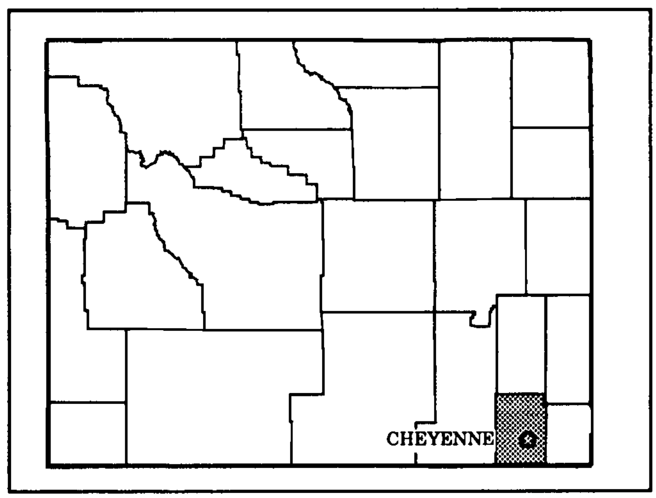


Figure 1.—Location of the survey area in Wyoming.

General Nature of the Survey Area

This section provides general information about the survey area. It describes history; water supply; industry, transportation, and recreation; agriculture; physiography and geology; and climate.

History

Before the introduction of horses to North America, Native Americans were known to have migrated through southeastern Wyoming using dogs and travois. These migrations involved the Cheyenne, Arapaho, Pawnee, Sioux, Comanche, and Kiowa. The Cheyenne, the Arapaho, and, later, the Sioux

eventually became dominant in the area with the rise of the horse culture of plains Indian tribes (Larson, 1977). The name Cheyenne is derived from the Sioux term for the Cheyenne tribe, Sha-hi-e-na, which means people whose language cannot be understood (Stands in Timber, 1967).

Laramie County was named after Jacques LaRamee, a French-Canadian fur trapper, who first came to Wyoming in the early 1800's along with other mountain men (Larson, 1977). In the 1850's and 1860's, the county was traversed by emigrants who were traveling the Lodgepole Creek route of the Overland Trail on their way to California or Oregon (Homsher, 1966).

Cheyenne was founded as an end-of-the-track city as the Union Pacific Railroad moved westward. The site was chosen in the spring of 1867 by General Grenville M. Dodge as a campsite for railroad workers. Fort D.A. Russell was established in September of the same year 3 miles to the northwest of the campsite to protect the railroad's surveying parties and other workers. The fort was later renamed Fort F.E. Warren in honor of the first State governor of Wyoming. It now serves as a missile base for the U.S. Air Force (Centennial Historical Committee, 1961).

The Union Pacific Railroad reached Cheyenne in November of 1867 and gave rise to the rapid construction of a temporary city of tents and shacks (Larson, 1977). The first public school in Wyoming was opened in Cheyenne in December 1867. The Cheyenne-Black Hills stage line traveled the 300 miles from Cheyenne to Deadwood, South Dakota, during the 1875 gold rush of the Black Hills region. Cheyenne was designated as the capital of Wyoming by the 1886 Territorial Legislature (Centennial Historical Committee, 1961).

The history of the area around Cheyenne has always been closely linked with that of the livestock industry. John Iliff trailed longhorn cattle from Texas to the area in 1868 to fulfill beef contracts with military posts along the railroad. Permanent year-round cattle ranches were established in the 1870's. However, sheep were more likely than cattle to survive the winters in southeastern Wyoming, and thus sheep ranching outpaced cattle ranching during the 1880's. The Wyoming Hereford Ranch near Cheyenne was founded in 1880 by Alexander Swan, who first introduced Hereford cattle to Wyoming. At the peak of the cattle ranching era in the late 1800's, large mansions were built in Cheyenne by successful cattle barons. Cheyenne Frontier Days, an internationally known rodeo, was established in 1897 as an outgrowth of the heyday of Wyoming cattle ranching (Centennial Historical Committee, 1961).

Water Supply

The survey area is drained by small, eastward-flowing streams. Chugwater Creek, Bear Creek, and Horse Creek in the northern half of the survey area are part of the North Platte River watershed. Lodgepole Creek, Crow Creek, and Lone Tree Creek in the southern half are part of the South Platte River watershed. Horse Creek and Chugwater Creek are the only perennial streams in the survey area. The other streams in the area have intermittent flow.

Industry, Transportation, and Recreation

The main areas of employment in the county are military and other government entities, oil refining, tourism, fertilizer manufacturing, and railroads. Ranching also is one of the main industries. There also is some mining and oil production.

Laramie County has a diverse public transportation system. Two railroads, one bus line, and one airline provide service for the area. The center of the transportation system is located at Cheyenne, where Interstate 80 and Interstate 25 intersect. U.S. Highway 85 also goes through Cheyenne.

Recreation in the area is diverse. Crystal Lake and Granite Reservoir offer camping, boating, and fishing. The hunting of antelope and mule deer also is a popular form of recreation. Cheyenne has golf courses, museums, and city parks. The Cheyenne Frontier Days rodeo is held every July.

Agriculture

Agriculture in the survey area includes ranching and farming. Ranches are throughout the survey area, but farms are primarily in the north-central and southeastern parts.

Ranching consists of cattle and sheep operations. The major emphasis is on cow-calf types of ranching, although there are also summer yearling operations. Cattle and sheep graze the rangeland during the growing season and are fed on locally grown hay during the winter. Most of the ranchers harvest a single crop of grass hay from subirrigated bottom lands. Small acreages of irrigated alfalfa hay are also grown where water is provided by a canal system.

Winter wheat is the principal nonirrigated crop in the survey area. It is grown in rotation with summer

fallow and is heavily dependent on soil moisture reserves acquired from late-winter snows and spring rains.

Physiography and Geology

The survey area lies along the western edge of the Denver structural basin. The basin is bordered on the west by the Laramie Mountains. The Laramie Mountains make up approximately one-fifth of the survey area and are a continuation of the Colorado Front Range. This range and basin were formed during the Laramide Orogeny, at the close of the Cretaceous Period, about 50 to 65 million years ago. As the mountains rose, accelerated erosion removed almost 20,000 feet of rock, nearly filling the basin to overflowing. Renewed uplift and erosion have since removed some of these sediments and have shaped the remaining ones to create present-day landforms.

A remnant of the original surface, known as the Gangplank, laps over the older rocks of the range to provide a gently sloping ramp, which extends from the mountains to the Wyoming-Nebraska border and beyond. In the late 1860's, the Gangplank was used by the Union Pacific Railroad to provide a shorter route for western emigration. In more recent years, it has also been used for Interstate 80.

A foothill hogback parallels the mountain range on its east side for nearly the entire length of the range as it occurs in the survey area. The Federal Valley lies at the base of the hogback and north of the Gangplank. It serves as a collection site for various mountain streams. To the east of the Federal Valley is a sloping tableland that merges with the Gangplank. The physiographical landforms of this tableland include ridges, hills, knolls, draws, fans, terraces, and dunes. The tableland belongs to the high plains section of the Northern Great Plains.

Elevation ranges from 5,800 feet near the community of Durham at the eastern edge of the survey area to about 8,200 feet in the mountains of the Laramie Range.

Five major geological formations associated with the Cenozoic, Mesozoic, Paleozoic, and Precambrian eras crop out in the survey area. The core of the Laramie Mountains consists of igneous and metamorphic rocks of the Precambrian era. These rocks are the oldest formations in the area and have been dated at about 1.4 billion years. The Federal Valley in the western part of the survey area was formed by exposure of the White River Formation, which was deposited as siltstone during the Oligocene epoch. The Federal Valley also contains the Pierre Shale of Cretaceous age, which occurs primarily in the middle part of the valley.

The lower two-thirds of the high plains section of the survey area is underlain by the Ogallala Formation. The Ogallala is the youngest bedrock formation in the survey area. It consists of gravel, sand, and silt washed down from the Laramie Mountains during the late Miocene epoch. The upper one-third of the high plains section was derived from the Arikaree Formation, which is a sandstone formation that dates back to the Miocene and late Oligocene. Other geological formations occur in the survey area but are of relatively minor extent. They are in areas of the foothill hogback.

Climate

The climate in the survey area is temperate with cool, moist springs; warm, moist summers; and cold, dry winters. The average annual precipitation ranges from 15 to 17 inches in the plains region of the survey area and from 17 to 19 inches in the Laramie Mountains. The frost-free period ranges from 120 to 140 days in the eastern part of the survey area, but it is only about 90 to 100 days in the western part.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Cheyenne in the period 1916 to 1993. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 28 degrees F and the average daily minimum temperature is 17 degrees. The lowest temperature on record is -38 degrees, which occurred on January 9, 1875. In summer, the average temperature is 65 degrees and the average daily maximum temperature is 79 degrees. The highest recorded temperature is 100 degrees, which occurred on June 23, 1954.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average total annual precipitation is about 15 inches. Of this, 11 inches, or 73 percent, usually falls in April through September. In 2 years out of 10, the rainfall in April through September is less than 6 inches. The heaviest 1-day rainfall during the period of record was 6 inches on August 1, 1975. Thunderstorms occur on about 50 days each year.

The average seasonal snowfall is about 55.7

inches. The greatest snow depth at any one time during the period of record was about 26 inches.

The average relative humidity in midafternoon is about 42 percent. Humidity is higher at night, and the average at dawn is about 62 percent. The sun shines 64 percent of the time possible. The prevailing winds are from the northwest. Average windspeed is 13 miles per hour.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and creeks, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey do not fully agree with those in

adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils within the survey areas.

General Soil Map Units

The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map units in this survey have been grouped into general kinds of landscapes for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

The general soil map of the western part of Laramie County is a part of the State Soil Geographic (STATSGO) database and general soil map of Wyoming. Map symbols are the same as those of the STATSGO general soil map units. For each map unit, two or three of the major soils or miscellaneous land types are described. More information regarding the general soil map units can be obtained from the STATSGO database, which is available from the Natural Resources Conservation Service.

Soils of the Flood Plains and Adjacent Uplands

The soils in this group are nearly level to rolling. The native vegetation is mainly grasses, forbs, and shrubs and scattered cottonwoods.

The soils in this group are very deep and are poorly drained or well drained. They are used mainly as rangeland, wildlife habitat, hayland, or cultivated cropland.

35. Merden-Ascalon-Altvan

Very deep, nearly level to rolling soils on flood plains and adjacent alluvial fans and terraces

This map unit is about 35 percent Merden and similar soils, 30 percent Ascalon and similar soils, and 10 percent Altvan and similar soils. Slopes are 0 to 15 percent.

The poorly drained, nearly level Merden soils are on flood plains. These soils formed in loamy alluvium derived from various sources. They are moderately fine textured throughout. They have a water table at a depth of 6 to 24 inches and are frequently flooded.

The well drained, nearly level to rolling Ascalon soils are on alluvial fans and terraces. These soils formed in loamy alluvium derived from various sources. They have a medium textured surface layer and a moderately fine textured subsoil. The substratum is medium textured.

The well drained, nearly level to rolling Altvan soils are on alluvial fans and terraces. These soils formed in loamy alluvium over sandy alluvium derived from various sources. The surface layer is medium textured, the upper part of the subsoil is moderately fine textured, and the lower part of the subsoil is very gravelly and is coarse textured.

This unit is used as rangeland, wildlife habitat, hayland, pasture, or cropland.

The Ascalon and Altvan soils are well suited to irrigated hay or pasture. The hazard of water erosion is a concern in the steeper areas. The Merden soils are moderately well suited to irrigated hay or pasture. They are limited by salinity, the hazard of flooding, and the high water table.

The Ascalon and Altvan soils are well suited to nonirrigated crops. The main concerns are the hazard of water erosion in the steeper areas and the hazard of wind erosion.

This unit is well suited to use as rangeland. Range seeding on the Merden soils, however, is limited by the wetness and the salinity.

375. Merden-Evanston-Chivington

Very deep, nearly level to rolling soils on flood plains, in draws, and on adjacent alluvial fans, hills, and terraces

This map unit is about 35 percent Merden and similar soils, 20 percent Evanston and similar soils, and 15 percent Chivington and similar soils. Slopes are 0 to 10 percent.

The poorly drained, nearly level Merden soils are on flood plains. These soils formed in alluvium derived from various sources. They are moderately fine textured throughout. They have a water table at a depth of 6 to 18 inches and are frequently flooded.

The well drained, nearly level to rolling Evanston soils are on alluvial fans, hills, and terraces. These soils formed in loamy alluvium derived from various sources. The surface layer is medium textured, the upper part of the subsoil is moderately fine textured, and the lower part of the subsoil is medium textured.

The well drained, nearly level or undulating Chivington soils are on alluvial fans, in draws, and on terraces. These soils formed in alluvium derived from various sources. They have a medium textured surface layer and a fine textured subsoil.

This unit is used mainly as rangeland or wildlife habitat. A few areas of the Merden soils are used as hayland or pasture. A few areas of the Evanston soils are used for nonirrigated crops.

This unit is well suited to use as rangeland. Range seeding on the Merden soils, however, is limited by the wetness.

Areas of the Merden soils are moderately well suited to hay and pasture. The main limitations are salinity, the hazard of flooding, and the high water table. Because of the limited availability of water for irrigation, the other soils in this unit are not used for irrigated hay or pasture.

If the Evanston soils are used for nonirrigated crops, the main limitations are the hazard of water erosion in the steeper areas and the hazard of wind erosion in the less sloping areas. The short growing season limits the kinds of crops that can be grown. Although the Chivington soils are not used for nonirrigated crops, they have the same suitability and limitations as the Evanston soils.

Soils of the Plains

The soils in this group are nearly level to hilly. The native vegetation is mainly grasses, forbs, and shrubs. The soils in this group are very shallow, shallow, and very deep and are well drained and excessively drained. They are used mainly as rangeland or wildlife habitat. A few areas are used for irrigated hay or pasture or for nonirrigated crops.

37. Ascalon-Altvan-Treon

Very shallow, shallow, and very deep, nearly level to hilly soils on alluvial fans, terraces, hills, knolls, and ridges

This map unit is about 35 percent Ascalon and similar soils, 25 percent Altvan and similar soils, and 20 percent Treon and similar soils. Slopes are 0 to 30 percent.

The nearly level to rolling Ascalon soils are on alluvial fans and terraces. These soils are very deep and are well drained. They formed in loamy alluvium derived from various sources. They have a medium textured surface layer and a moderately fine textured subsoil. The substratum is medium textured.

The nearly level to rolling Altvan soils are on hillcrests, alluvial fans, and terraces. These soils are very deep and are well drained. They formed in loamy alluvium over sandy alluvium derived from various sources. The surface layer is medium textured, the upper part of the subsoil is moderately fine textured, and the lower part of the subsoil is very gravelly and is coarse textured.

The rolling or hilly Treon soils are on knolls, hills, and ridges. These soils are very shallow or shallow and are well drained. They formed in loamy residuum derived from sandstone. They are moderately coarse textured throughout. The depth to sandstone bedrock ranges from 4 to 20 inches.

Most areas of this unit are used as rangeland or wildlife habitat. A few areas are used as irrigated hayland or pasture or as nonirrigated cropland.

Most areas of this unit are well suited to use as rangeland. The production of vegetation suitable for livestock grazing in areas of the Treon soils is limited by droughtiness.

The Ascalon and Altvan soils are well suited to irrigated hay and pasture. The hazard of water erosion is a concern in the steeper areas. The Treon soils are poorly suited to use as cropland because of the slope, the hazards of wind erosion and water erosion, and the droughtiness.

The Ascalon and Altvan soils are well suited to irrigated hay and pasture. The main concern is the hazard of water erosion in the steeper areas.

38. Treon-Dix-Aberone

Very shallow, shallow, and very deep, undulating to hilly soils on terraces, ridges, knolls, and hills and in associated draws

This map unit is about 40 percent Treon and similar soils, 20 percent Dix and similar soils, and 20 percent Aberone and similar soils. Slopes are 3 to 30 percent.

The undulating to hilly Treon soils are on ridges, knolls, and hills. These soils are very shallow or shallow and are well drained. They formed in loamy residuum derived from sandstone. They are moderately coarse textured throughout. The depth to sandstone bedrock ranges from 4 to 20 inches.

The rolling or hilly Dix soils are on terraces and hills. These soils are very deep and are excessively drained. They formed in extremely gravelly sandy alluvium derived from various sources. They have a gravelly, medium textured surface layer. The underlying material is extremely gravelly and is coarse textured.

The undulating to hilly Aberone soils are on terraces and hills and in draws. These soils are very deep and are well drained. They formed in loamy alluvium and colluvium derived from various sources. The surface layer and the upper part of the subsoil are moderately coarse textured. The lower part of the subsoil is very gravelly and is coarse textured.

This unit is used mainly as rangeland or wildlife habitat.

Most areas of this unit are well suited to livestock grazing. The production of vegetation suitable for livestock grazing in areas of the Treon soils is limited by droughtiness.

152. Manter-Treon-Aberone

Very shallow, shallow, and very deep, nearly level to hilly soils on alluvial fans, terraces, knolls, hills, and ridges and in associated draws

This map unit is about 35 percent Manter and similar soils, 25 percent Treon and similar soils, and 20 percent Aberone and similar soils. Slopes are 0 to 30 percent.

The nearly level to hilly Manter soils are on alluvial fans, knolls, hills, and terraces. These soils are very deep and are well drained. They formed in loamy alluvium and eolian deposits derived from sandstone. They are moderately coarse textured throughout.

The undulating to hilly Treon soils are on knolls, ridges, and hills. These soils are very shallow or shallow and are well drained. They formed in loamy residuum derived from sandstone. They are moderately coarse textured throughout. The depth to sandstone bedrock ranges from 4 to 20 inches.

The undulating to hilly Aberone soils are on terraces and hills and in draws. These soils are very deep and are well drained. They formed in loamy alluvium and colluvium derived from various sources. The surface layer and the upper part of the subsoil are moderately coarse textured. The lower part of the subsoil is very gravelly and is coarse textured.

This unit is used mainly as rangeland or wildlife habitat. A few areas are used for nonirrigated crops, mainly winter wheat.

Most areas of this unit are well suited to livestock grazing. The production of vegetation suitable for livestock grazing in areas of the Treon soils is limited by droughtiness.

The Manter soils are moderately suited to use as nonirrigated cropland. The main limitations are droughtiness, the hazard of water erosion in the steeper areas, and the hazard of wind erosion. The Treon soils are poorly suited to use as nonirrigated cropland because of the slope, the hazards of wind erosion and water erosion, and the droughtiness. The Aberone soils are poorly suited to use as nonirrigated cropland because of the droughtiness and the hazard of wind erosion.

153. Vetal-Treon-Bayard

Very shallow, shallow, and very deep, nearly level to rolling soils on alluvial fans, in draws, and on terraces, knolls, hills, and ridges

This map unit is about 30 percent Vetal and similar soils, 20 percent Treon and similar soils, and 10 percent Bayard and similar soils. Slopes are 0 to 15 percent.

The nearly level or undulating Vetal soils are on alluvial fans and in draws. These soils are very deep and are well drained. They formed in loamy alluvium derived from sandstone. They are moderately coarse textured throughout.

The undulating or rolling Treon soils are on knolls and hills. These soils are very shallow or shallow and are well drained. They formed in loamy residuum derived from sandstone. They are moderately coarse textured throughout. The depth to sandstone bedrock ranges from 4 to 20 inches.

The nearly level to rolling Bayard soils are on alluvial fans, in draws, and on terraces. These soils are very deep and are well drained. They formed in loamy alluvium and colluvium derived from sandstone. They are moderately coarse textured throughout.

Most areas of this unit are used as rangeland or wildlife habitat. A few areas of the Bayard soils are used for irrigated hay or pasture.

Most areas of this unit are well suited to livestock grazing. The production of vegetation suitable for livestock grazing in areas of the Treon soils is limited by droughtiness.

The Bayard soils are moderately well suited to use as irrigated hayland and pasture. The main limitation is the hazard of water erosion in the steeper areas. The availability of irrigation water is also a concern. Although the Vetal soils are not used for irrigated hay or pasture, they have the same suitability and limitations as the Bayard soils. The Treon soils are poorly suited to use as irrigated hayland or pasture because of the droughtiness and the hazards of wind erosion and water erosion.

288. Taluce-Embry-Manter

Very shallow, shallow, and very deep, nearly level to hilly soils on alluvial fans, terraces, knolls, hills, and ridges

This map unit is about 35 percent Taluce and similar soils, 20 percent Embry and similar soils, and 15 percent Manter and similar soils. Slopes are 0 to 30 percent.

The undulating to hilly Taluce soils are on ridges and hills. These soils are very shallow or shallow and are well drained. They formed in loamy residuum derived from sandstone. They are moderately coarse textured. The depth to sandstone bedrock ranges from 4 to 20 inches.

The nearly level to rolling Embry soils are on hills, terraces, and alluvial fans. These soils are very deep and are well drained. They formed in loamy alluvium and eolian deposits derived from sandstone. They are coarse textured in the surface layer and moderately coarse textured in the underlying material.

The nearly level to hilly Manter soils are on alluvial fans, knolls, hills, and terraces. These soils are very deep and are well drained. They formed in loamy alluvium and in eolian deposits derived from sandstone. They are moderately coarse textured throughout.

This unit is used mainly as rangeland or wildlife habitat. A few areas of the Manter soils are used for nonirrigated crops, mainly winter wheat.

Most areas of this unit are well suited to livestock grazing. The production of vegetation suitable for livestock grazing in areas of the Taluce soils is limited by droughtiness.

The Manter soils are moderately suited to use as nonirrigated cropland. The main limitations are droughtiness, the hazard of water erosion in the steeper areas, and the hazard of wind erosion. Although the Embry soils are not used as cropland, they have the same suitability and limitations as the Manter soils. The Taluce soils are poorly suited to use as nonirrigated cropland because of the slope, the hazards of wind erosion and water erosion, and the droughtiness.

Soils of the Foothills

The soils in this group are nearly level to steep. The native vegetation is mainly grasses, forbs, and shrubs.

The soils in this group are very deep, shallow, and very shallow and are well drained. They are used mainly as rangeland or wildlife habitat. A few areas are used for nonirrigated cultivated crops.

39. Evanston-Trimad-Poposhia

Very deep, nearly level to steep soils on alluvial fans, terraces, knolls, hills, and ridges, in associated draws, and on associated valley floors

This map unit is about 35 percent Evanston and similar soils, 25 percent Trimad and similar soils, and 15 percent Poposhia and similar soils. Slopes are 0 to 45 percent.

The nearly level to steep Evanston soils are on alluvial fans, hills, and terraces. These soils formed in loamy alluvium derived from various sources. The surface layer is medium textured, the upper part of the subsoil is moderately fine textured, and the lower part of the subsoil is medium textured.

The rolling to steep Trimad soils are on hills and ridges. These soils formed in very gravelly loamy alluvium derived from various sources. They have a gravelly, medium textured surface layer. The upper part of the subsoil is very gravelly and is medium textured. The lower part of the subsoil is very gravelly and is moderately coarse textured.

The nearly level to rolling Poposhia soils are on alluvial fans, hills, valley floors, and knolls and in draws. These soils formed in silty alluvium and residuum derived from siltstone. They are medium textured throughout.

This unit is used mainly as rangeland or wildlife habitat. A few areas of the Evanston and Poposhia soils are used for nonirrigated crops.

This unit is well suited to use as rangeland.

The Evanston and Poposhia soils are moderately well suited to use as nonirrigated cropland. The main limitations are the short growing season, the hazard of

water erosion in the steeper areas, and the hazard of wind erosion. The Trimad soils are poorly suited to use as nonirrigated cropland because of droughtiness, the slope, and the hazard of water erosion.

157. Ipson-Evanston-Trimad

Very deep, nearly level to steep soils on alluvial fans, terraces, knolls, hills, and ridges

This map unit is about 35 percent Ipson and similar soils, 25 percent Evanston and similar soils, and 20 percent Trimad and similar soils. Slopes are 0 to 45 percent.

The rolling to steep Ipson soils are on alluvial fans, ridges, hills, and knolls. These soils formed in very gravelly loamy alluvium derived from various sources. The surface layer is gravelly and is medium textured. The upper part of the subsoil is very gravelly and is moderately fine textured. The lower part of the subsoil is very gravelly and is coarse textured.

The nearly level to steep Evanston soils are on alluvial fans, hills, and terraces. These soils formed in very gravelly loamy alluvium derived from various sources. The surface layer is gravelly and is medium textured. The upper part of the subsoil is very gravelly and is moderately fine textured. The lower part of the subsoil is gravelly and is medium textured.

The rolling to steep Trimad soils are on alluvial fans, hills, and ridges. These soils formed in very gravelly loamy alluvium derived from various sources. The surface layer is gravelly and is medium textured. The upper part of the subsoil is very gravelly and is medium textured. The lower part of the subsoil is very gravelly and is moderately coarse textured.

This unit is used as rangeland or wildlife habitat.

Many areas of this unit are well suited to livestock grazing. In some areas, however, the slope limits access by livestock.

292. Ipson-Evanston-Tyzak

Very shallow, shallow, and very deep, nearly level to steep soils on alluvial fans, terraces, knolls, hills, and ridges

This map unit is about 40 percent Ipson and similar soils, 30 percent Evanston and similar soils, and 15 percent Tyzak and similar soils. Slopes are 0 to 50 percent.

The rolling to steep Ipson soils are on alluvial fans, hills, ridges, and knolls. These soils are very deep. They formed in very gravelly loamy alluvium derived from various sources. The surface layer is gravelly and is medium textured. The upper part of the subsoil is very gravelly and is moderately fine textured. The lower part of the subsoil is very gravelly and is moderately coarse textured.

The nearly level to steep Evanston soils are on alluvial fans, hills, and terraces. These soils are very deep. They formed in loamy alluvium derived from various sources. They have a medium textured surface layer and are moderately fine textured in the upper part of the subsoil. The lower part of the subsoil is medium textured.

The rolling to steep Tyzak soils are on hills, ridges, and hogbacks. These soils are very shallow or shallow. They formed in very channery loamy residuum and colluvium derived from limestone. They have a channery and medium textured surface layer and a very channery and medium textured subsoil. The depth to limestone bedrock ranges from 4 to 20 inches.

This unit is used as rangeland or wildlife habitat.

Many areas of this unit are well suited to livestock grazing. In some areas, however, the slope limits access by livestock. The production of vegetation suitable for livestock grazing in areas of the Tyzak soils is limited by droughtiness.

374. Poposhia-Blazon-Trimad

Very shallow, shallow, and very deep, nearly level to steep soils on alluvial fans, knolls, hills, and ridges

This map unit is about 30 percent Poposhia and similar soils, 25 percent Blazon and similar soils, and 15 percent Trimad and similar soils. Slopes are 0 to 60 percent.

The nearly level to rolling Poposhia soils are on alluvial fans, hills, and knolls. These soils are very deep. They formed in silty alluvium and residuum derived from siltstone. They are medium textured throughout.

The rolling to steep Blazon soils are on ridges and hills. These soils are very shallow or shallow. They formed in silty alluvium and residuum derived from siltstone. The surface layer is gravelly and is medium textured. The underlying material is medium textured. The depth to siltstone bedrock ranges from 4 to 20 inches.

The rolling to steep Trimad soils are on alluvial fans, knolls, and ridges. These soils are very deep. They formed in very gravelly loamy alluvium derived from various sources. The surface layer is gravelly and is medium textured. The upper part of the subsoil is very

gravelly and is medium textured. The lower part of the subsoil is very gravelly and is moderately coarse textured.

This unit is used as rangeland or wildlife habitat.

This unit is moderately suited to livestock grazing. In many areas the slope limits access by livestock. The production of vegetation suitable for livestock grazing in areas of the Blazon soils is limited by droughtiness.

Soils of the Mountains

The soils in this group are nearly level to steep. The native vegetation is mainly grasses, forbs, and shrubs. Some areas also support ponderosa pine.

The soils in this group are very shallow, shallow, moderately deep, and very deep and are well drained. They are used mainly as rangeland or wildlife habitat.

131. Boyle-Lininger-Rock Outcrop

Very shallow, shallow, and moderately deep, nearly level to steep soils and Rock outcrop on foothills, hogbacks, and mountain ridges

This map unit is about 30 percent Boyle and similar soils, 25 percent Lininger and similar soils, and 20 percent Rock outcrop. Slopes are 0 to 30 percent.

The undulating to steep Boyle soils are on mountain ridges and foothills. These soils are shallow or very shallow. They formed in very gravelly loamy residuum derived from granite, schist, and gneiss. They have a gravelly, medium textured surface layer and a very gravelly, moderately fine textured subsoil. The depth to bedrock ranges from 4 to 20 inches.

The nearly level to steep Lininger soils are on foothills and mountain ridges. These soils are moderately deep. They formed in loamy alluvium and colluvium derived from granite, schist, and gneiss. They have a medium textured surface layer and a moderately fine textured subsoil. The depth to bedrock ranges from 20 to 40 inches.

Rock outcrop consists of exposed areas of granite.

Most areas of this unit are used as rangeland or wildlife habitat.

This unit is moderately suited to livestock grazing. The production of vegetation suitable for livestock grazing is limited by the Rock outcrop and by the droughtiness of the Boyle soils.

253. Tyzak-Redthayne-Rock Outcrop

Very shallow, shallow, and very deep, undulating to steep soils and Rock outcrop on hills, ridges, and hogbacks

This map unit is about 35 percent Tyzak and similar soils, 15 percent Redthayne and similar soils, and 15 percent Rock outcrop. Slopes are 3 to 50 percent.

The rolling to steep Tyzak soils are on hills, ridges, and hogbacks. These soils are very shallow or shallow. They formed in residuum derived from limestone. They have a channery, medium textured surface layer and a very channery, medium textured subsoil. The depth to limestone bedrock ranges from 4 to 20 inches.

The undulating to hilly Redthayne soils are on ridges, hills, and hogbacks. These soils are very deep. They formed in very channery loamy colluvium derived from various sources. They have a channery, medium textured surface layer and a very channery, medium textured subsoil.

Rock outcrop consists of exposed areas of granite.

Most areas of this unit are used as rangeland or wildlife habitat.

This unit is moderately suited to livestock grazing. In many areas, the slope limits access by livestock. The production of vegetation suitable for livestock grazing is limited by the Rock outcrop and by the droughtiness of the Tyzak soils.

Detailed Soil Map Units

The map units delineated on the detailed soil maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer or of the subsoil, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the subsoil. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Vetal fine sandy loam, 0 to 6 percent slopes, is a phase of the Vetal series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Altvan-Dix complex, 6 to 10 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps.

Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Boyle-Lininger association, 1 to 15 percent slopes, is an example.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see Contents) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

100—Albinas loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and terraces and in draws. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Ascalon loam on alluvial fans and terraces. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Albinas soil is dark brown loam about 3 inches thick. The upper part of the subsoil is dark brown sandy clay loam about 22 inches thick. The lower part of the subsoil to a depth of 60 inches or more is brown loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as irrigated hayland, nonirrigated cropland, rangeland, or wildlife habitat.

This unit is well suited to irrigated hay. Sprinkler irrigation systems are suitable. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

This unit is well suited to nonirrigated crops. The main limitations are the low annual precipitation and the hazard of wind erosion. Because precipitation is insufficient for annual crops, a cropping system that includes small grain in rotation with summer fallow should be used. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of threadleaf sedge and blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. This soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation.

This unit is well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture.

This unit is in capability subclass IIIe, nonirrigated and irrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

101—Altvan loam, 0 to 6 percent slopes

This very deep, well drained soil is on terraces and alluvial fans. It formed in loamy alluvium over sandy alluvium derived from various sources. The native vegetation is mainly grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air

temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Ascalon and Wages loam on terraces and Albinas loam on alluvial fans and in draws. The percentage varies from one delineation to another.

Typically, the surface layer of the Altvan soil is brown loam about 4 inches thick. The upper part of the subsoil is dark brown sandy clay loam about 4 inches thick. The next part is brown sandy clay loam about 16 inches thick. The lower part to a depth of 60 inches or more is yellowish brown very gravelly sand.

Permeability is moderate in the upper part of the subsoil and very rapid in the lower part of the subsoil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as nonirrigated cropland, irrigated hayland, rangeland, or wildlife habitat.

This unit is moderately well suited to nonirrigated crops. The main limitations are the low annual precipitation and the hazard of wind erosion. Because precipitation is insufficient for annual crops, a cropping system that includes small grain in rotation with summer fallow should be used. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue after tillage.

This unit is moderately well suited to irrigated hay. The main limitation is droughtiness. Sprinkler irrigation is the best method for this soil. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community is mainly needleandthread, western wheatgrass, little bluestem, and blue grama. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and the droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture.

This unit is in capability subclass IIIe, nonirrigated and irrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

102—Altvan-Dix complex, 6 to 10 percent slopes

This map unit is on hills, terraces, and alluvial fans. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Altvan loam, 6 to 8 percent slopes, and 30 percent Dix gravelly loam, 6 to 10 percent slopes. The Altvan soil is on terraces and alluvial fans, and the Dix soil is on terraces and hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Ascalon loam on alluvial fans and terraces. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Altvan soil is very deep and is well drained. It formed in loamy alluvium over sandy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper part of the subsoil is brown sandy clay loam about 15 inches thick. The next part is pale brown loam about 4 inches thick. The lower part to a depth of 60 inches or more is brown very gravelly sand.

Permeability is moderate in the upper part of the subsoil in the Altvan soil and very rapid in the lower part of the subsoil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Dix soil is very deep and is excessively drained. It formed in sandy alluvium derived from various sources. Typically, 15 to 20 percent of the surface is covered with gravel. The surface layer is dark brown gravelly loam about 11 inches thick. The upper 12 inches of the underlying material is pale brown very gravelly sandy loam. The lower part of the underlying material to a depth of 60 inches or more is yellowish brown very gravelly sand.

Permeability is rapid in the Dix soil. The available water capacity is very low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used as rangeland, irrigated hayland, nonirrigated cropland, or wildlife habitat.

The Altvan soil is moderately well suited to irrigated hay and nonirrigated crops. The main limitation affecting irrigated hay is droughtiness. The main limitations affecting nonirrigated crops are the low annual precipitation, the droughtiness, and the hazard of water erosion. The Dix soil is poorly suited to irrigated hay and nonirrigated crops. The main limitations are the hazard of water erosion, the gravelly surface layer, and the droughtiness.

If this unit is used for irrigated hay, a sprinkler system is the best method of irrigation. Frequent applications of irrigation water are necessary because of the limited available water capacity. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

If this unit is used as nonirrigated crops, precipitation is insufficient for annual crops. A cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage. Tilling across the slope reduces the hazard of water erosion.

The potential plant community on the Altvan soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Dix soil is mainly little bluestem, bluebunch wheatgrass, Indian ricegrass, and needleandthread. The extent of blue grama and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 600 pounds of air-dry vegetation per acre in a normal year. Production ranges from 900 pounds in favorable years to 400 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This unit is poorly suited to stockwater ponds because of the potential for seepage. The Altvan soil is moderately well suited to range seeding and is well suited to mechanical range renovation. The main limitations affecting range seeding are the hazards of wind erosion and water erosion. The Dix soil is poorly suited to range seeding and mechanical range renovation. The main limitations are the gravelly surface layer and the droughtiness.

Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage should be along the contour.

The Altvan soil is moderately well suited to windbreaks and environmental plantings. The Dix soil is poorly suited. The main limitations are the low annual precipitation and the droughtiness. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Altvan soil is in capability subclass IVe, nonirrigated and irrigated. The Dix soil is in capability

subclass VIIs, nonirrigated, and VIs, irrigated. The Altvan soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Dix soil is in the Gravelly, 15- to 17-inch precipitation zone, Southern Plains range site.

103—Ascalon fine sandy loam, 6 to 9 percent slopes

This very deep, well drained soil is on dissected terraces. It formed in loamy alluvium derived dominantly from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Altvan fine sandy loam, Dix gravelly loam, Peetz gravelly sandy loam, and rock outcrop. These areas make up about 20 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Ascalon soil is dark brown fine sandy loam about 6 inches thick. The upper part of the subsoil is brown sandy clay loam about 15 inches thick. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly western wheatgrass, needleandthread, and blue grama. The extent of blue grama and sedges increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is poorly suited to stockwater ponds because of the potential for seepage. It is only moderately well suited to mechanical range renovation and range seeding because of the hazards of wind erosion and water erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Weed barriers may be used to minimize competition from weeds and to conserve soil moisture. Cultivating the area between the rows of trees and shrubs or spraying with herbicides helps to minimize competition from weeds. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

104—Ascalon loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and terraces. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Altvan loam and Wages loam on terraces and alluvial fans. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Ascalon soil is dark brown loam about 9 inches thick. The upper 14 inches of the subsoil is yellowish brown sandy clay loam. The next 3 inches is dark yellowish brown sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

Some areas are used as irrigated hayland or nonirrigated cropland.

This unit is well suited to nonirrigated crops. The main limitations are the low annual precipitation and the hazard of wind erosion. Because precipitation is insufficient for annual crops, a cropping system that includes small grain in rotation with summer fallow should be used. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage.

This unit is well suited to irrigated hay. Sprinkler irrigation is the best method. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The soil is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture.

This unit is in capability subclass IIIe, nonirrigated and irrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

105—Bayard fine sandy loam, 0 to 15 percent slopes

This very deep, well drained soil is on terraces and alluvial fans. It formed in loamy alluvium derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Paoli fine sandy loam on alluvial fans and terraces and in draws. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Bayard soil is dark brown fine sandy loam about 10 inches thick. The upper part of the underlying material is brown fine sandy loam about 19 inches thick. The lower part of the underlying material to a depth of 60 inches or more is pale brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

This unit is moderately well suited to irrigated hay. The main limitations are the slope and droughtiness. Sprinkler irrigation is the most suitable method because of the slope. If corrugation irrigation systems are used, the run of the irrigation systems should be on the contour. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Frequent applications of irrigation water are necessary because of the limited available water capacity. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues

to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. The hazard of water erosion also is a concern in areas where the slope is more than 6 percent. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion in areas that have slopes of more than 6 percent.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

This unit is in capability subclass IVe, nonirrigated, and IIIe, irrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

106—Bayard fine sandy loam, wet, 0 to 3 percent slopes

This very deep, moderately well drained soil is on flood plains. It formed in stratified loamy alluvium derived from various sources. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Merden silt loam in swales and depressions and riverwash in stream channels. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Bayard soil is grayish brown fine sandy loam about 10 inches thick. The upper part of the underlying material is grayish brown sandy loam about 19 inches thick. The lower part of the underlying material to a depth of 60 inches or more is light gray very fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe. Depth to the seasonal high water table is 3 to 5 feet from April through July. This soil is subject to occasional brief periods of flooding in April and May.

This unit is used mainly as irrigated hayland, rangeland, or wildlife habitat.

This unit is well suited to hay. Management practices that include proper grazing use and fertilization are needed to maintain optimum vigor and quality of forage plants. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Frequent applications of irrigation water are necessary because of the limited available water capacity. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff.

The potential plant community is mainly needleandthread, little bluestem, western wheatgrass, Indian ricegrass, and eastern cottonwood. The extent of woody species increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, western ragweed and Kentucky bluegrass will invade. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,000 pounds in favorable years to 1,800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is moderately well suited to stockwater ponds. Pits dug to a depth below the level of the water table can provide water for livestock. Because of the fluctuating level of the water table, the pits may not provide a source of water throughout the year. An onsite study should be conducted to determine the level of the water table in the soil at various times of the year. The soil will not hold water above the level of the water table for a long period of time because of the seepage potential.

This soil is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

If this unit is used for windbreaks or environmental plantings, the main limitation is the low annual precipitation. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, irrigated, and IVe, nonirrigated. It is in the Lowland, 15- to 17-inch precipitation zone, Southern Plains range site.

107—Bayard-Paoli fine sandy loams, 0 to 10 percent slopes

This map unit is on terraces, in draws, and on alluvial fans. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Bayard fine sandy loam, 0 to 10 percent slopes, and 30 percent Paoli fine sandy loam, 0 to 5 percent slopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Otero fine sandy loam on alluvial fans, hills, and knolls. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Bayard soil is very deep and is well drained. It formed in loamy alluvium derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The upper 26 inches of the underlying material is pale brown fine sandy loam. The lower part of the underlying material to a depth of 60 inches or more is pale brown fine sandy loam.

Permeability is moderately rapid in the Bayard soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Paoli soil is very deep and is well drained. It formed in loamy alluvium derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The upper 13 inches of the subsoil also is dark brown fine sandy loam. The lower part to a depth of 60 inches or more is brown fine sandy loam.

Permeability is moderately rapid in the Paoli soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used as rangeland, irrigated hayland, or wildlife habitat.

This unit is well suited to irrigated hay. The slope and the hazard of water erosion, however, are limitations in areas that have slopes of more than 6 percent. A sprinkler system is the best method of irrigation. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community on this unit is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both.

Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This unit is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. The hazard of water erosion also is a concern in areas that have slopes of more than 6 percent. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion in areas that have slopes of more than 6 percent.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Bayard soil is in capability subclass IVe, nonirrigated, and IIIe, irrigated. The Paoli soil is in capability subclass IIIe, nonirrigated and irrigated. This unit is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

108—Blazon-Blazon, thin solum-Poposhia silt loams, 0 to 6 percent slopes

This map unit is on hills and knolls, in the adjacent draws, and on alluvial fans. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Blazon silt loam, 3 to 6 percent slopes; 35 percent Blazon silt loam, thin solum, 3 to 6 percent slopes; and 20 percent Poposhia silt loam, 0 to 4 percent slopes. The Blazon soils are on hills, and the Poposhia soil is in draws and on alluvial fans and knolls. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Piezon silt loam on hills. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Blazon soil is shallow and well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is pale brown silt loam about 6 inches thick. The underlying material also is pale brown silt loam. It is about 6 inches thick. Semiconsolidated siltstone is at a depth of 12 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Blazon, thin solum, soil is very shallow and is well drained. It formed in silty residuum derived from siltstone. Typically, the surface layer is yellowish brown silt loam about 3 inches thick. The underlying material also is yellowish brown silt loam. It is about 4 inches thick. Semiconsolidated siltstone is at a depth of 7 inches.

Permeability is moderate in the Blazon, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is very pale brown silt loam about 12 inches thick. The underlying material to a depth of 60 inches or more also is very pale brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and

cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Blazon, thin solum, soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Poposhia soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management. The distribution of livestock may be limited by the availability of water.

The Blazon soils are poorly suited to stockwater ponds because of the depth to bedrock. The Poposhia soil is only moderately well suited to stockwater ponds because of the moderate potential for seepage. The Blazon soils are poorly suited to mechanical range renovation and range seeding. Mechanical range renovation and range seeding on the Blazon soils may not be economically feasible because of droughtiness. The Poposhia soil is well suited to mechanical range renovation and range seeding. Mechanical range renovation may be used in areas of the Poposhia soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

The Blazon soils are poorly suited to windbreaks and environmental plantings because of the depth to bedrock. The Poposhia soil is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

The Blazon soils are in capability subclass VIIe, nonirrigated. The Poposhia soil is in capability subclass IVe, nonirrigated. The Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site; the Blazon, thin solum, soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site; and the Poposhia soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

109—Blazon-Chaperton complex, 3 to 20 percent slopes

This map unit is on hills and ridges. The native vegetation consists mainly of grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 65 percent Blazon gravelly silt loam, 10 to 20 percent slopes, and 20 percent Chaperton loam, 3 to 15 percent slopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Chivington loam and Weed loam in swales. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Blazon soil is shallow and well drained. It formed in silty alluvium and residuum derived from shale interbedded with sandstone. Typically, the surface layer is brown gravelly silt loam about 2 inches thick. The underlying material is yellowish brown silt loam. It is about 13 inches thick. Semiconsolidated shale interbedded with sandstone is at a depth of 15 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Chaperton soil is moderately deep and is well drained. It formed in loamy residuum and alluvium derived from shale and siltstone. Typically, the surface layer is yellowish brown loam about 9 inches thick. The

subsoil is yellowish brown clay loam about 18 inches thick. Semiconsolidated shale is at a depth of 27 inches.

Permeability is moderate in the Chaperton soil. The available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Chaperton soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds because of the depth to bedrock and the slope. The Blazon soil is poorly suited to mechanical range renovation and range seeding because of the slope, the hazard of water erosion, and droughtiness. The Chaperton soil is moderately well suited to mechanical range renovation and range seeding. The main limitation is the hazard of water erosion. Mechanical range renovation may be used in areas of the Chaperton soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

The Blazon soil is poorly suited to windbreaks and environmental plantings. It should not be used as a site for these plantings. The Chaperton soil is moderately suited. The main limitations are the depth to bedrock, the low annual precipitation, and the droughtiness. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. Windbreaks should be planted at a right angle to the prevailing winds.

The Blazon soil is in capability subclass VIIe, nonirrigated, and the Chaperton soil is in capability subclass VIe, nonirrigated. The Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Chaperton soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

110—Blazon-Chaperton-Rock outcrop complex, 10 to 45 percent slopes

This map unit is on ridges and hills. The native vegetation consists mainly of grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Blazon loam, 20 to 45 percent slopes; 30 percent Chaperton loam, 10 to 30 percent slopes; and 25 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Chivington loam in draws. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Blazon soil is shallow and well drained. It formed in silty residuum and alluvium derived from shale interbedded with sandstone. Typically, the surface layer is dark brown loam about 2 inches thick. The underlying material is light yellowish brown clay loam. It is about 11 inches thick. Semiconsolidated shale is at a depth of 13 inches.

Permeability is moderately slow in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Chaperton soil is moderately deep and is well

drained. It formed in loamy residuum and alluvium derived from shale. Typically, the surface layer is dark brown loam about 6 inches thick. The upper 12 inches of the subsoil is light brownish gray silty clay loam. The lower 11 inches is light gray clay loam. Semiconsolidated shale is at a depth of 29 inches.

Permeability is moderate in the Chaperton soil. The available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop consists of exposed areas of semiconsolidated shale bedrock.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Chaperton soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to stockwater ponds, mechanical range renovation, and range seeding because of the slope. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Blazon soil is in capability subclass VIIe, nonirrigated; the Chaperton soil is in capability subclass VIe, nonirrigated; and the Rock outcrop is in capability subclass VIIIs. The Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Chaperton soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

111—Blazon-Trimad complex, 15 to 45 percent slopes

This map unit is on hills and ridges and the adjacent alluvial fans. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Blazon silt loam, 15 to 45 percent slopes, and 40 percent Trimad loam, 15 to 45 percent slopes. The Blazon soil is on hills and ridges, and the Trimad soil is on hills, alluvial fans, and ridges. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Poposhia silt loam on alluvial fans, valley floors, and knolls. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Blazon soil is shallow and well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is brown silt loam about 4 inches thick. The underlying material is pale brown silt loam. It is about 8 inches thick. Semiconsolidated siltstone is at a depth of 12 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the upper 5 inches of the surface layer is dark brown loam. The lower 5 inches of the surface layer is brown loam. The upper 23 inches of the subsoil is pale brown very gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is very pale brown very gravelly loam.

Permeability is moderately rapid in the Trimad soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and

western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Trimad soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to stockwater ponds, mechanical range renovation, and range seeding because of the slope. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

This unit is in capability subclass VIIe, nonirrigated. The Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Trimad soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

112—Boyle-Alderon-Cathedral complex, 5 to 45 percent slopes

This map unit is on mountain ridges and foothills. The native vegetation consists mainly of grasses, forbs, shrubs, and coniferous trees. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Boyle gravelly loam, 5 to 45 percent slopes; 30 percent Alderon gravelly sandy loam, 5 to 35 percent slopes; and 20 percent Cathedral gravelly sandy loam, 5 to 45 percent slopes. The Boyle and Cathedral soils are on crests and the upper part of the slopes, and the Alderon soil is on the lower part of the slopes. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop on side slopes of hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite. Typically, the surface layer is dark brown gravelly loam about 3 inches thick. The subsoil is brown very gravelly sandy clay loam about 13 inches thick. Semiconsolidated granite is at a depth of 16 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Alderon soil is moderately deep and is well drained. It formed in loamy residuum and colluvium derived from granite. Typically, the surface is covered by a 2-inch layer of forest litter. The surface layer is brown gravelly sandy loam about 4 inches thick. The upper 8 inches of the subsoil is brown sandy clay loam. The lower 21 inches of the subsoil is brown gravelly sandy clay loam. Semiconsolidated granite is at a depth of 33 inches.

Permeability is moderate in the Alderon soil. The available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Cathedral soil is shallow and well drained. It formed in very gravelly loamy residuum and colluvium derived from granite. Typically, the surface is covered by a layer of pine needles and twigs. The surface layer is dark brown gravelly sandy loam about 7 inches thick. The underlying material is very pale brown very gravelly sandy loam. It is about 12 inches thick. Consolidated granite is at a depth of 19 inches.

Permeability is moderately rapid in the Cathedral soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Boyle and Cathedral soils is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. A few ponderosa pine trees occur in many areas. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate.

If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

The present plant community on the Alderon soil is ponderosa pine with an understory of mainly Idaho fescue, bluebunch wheatgrass, and Griffith wheatgrass.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds. The main limitation is the slope. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Boyle and Cathedral soils are in capability subclass VIIe, nonirrigated. The Alderon soil is in capability subclass VIe, nonirrigated. The Boyle and Cathedral soils are in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site. The Alderon soil is in a ponderosa pine woodland site.

113—Boyle-Boyle, thin solum, gravelly loams, 3 to 6 percent slopes

This map unit is on foothills and mountain ridges. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 55 percent Boyle gravelly loam and 40 percent Boyle, thin solum, gravelly loam. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Cathedral gravelly sandy loam on side slopes of ridges and hills. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite. Typically, the surface layer is dark brown gravelly loam about 7 inches thick. The subsoil is brown very gravelly sandy clay loam about 8 inches thick. The substratum is brown very gravelly sand about 2 inches thick. Semiconsolidated granite is at a depth of 17 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Boyle, thin solum, soil is very shallow and is well drained. It formed in very gravelly loamy residuum derived from granite. Typically, the surface layer is yellowish brown gravelly loam about 2 inches thick. The subsoil is brown very gravelly sandy clay loam about 6 inches thick. Semiconsolidated granite is at a depth of 8 inches.

Permeability is moderate in the Boyle, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Boyle soil is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 900 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Boyle, thin solum, soil is mainly bluebunch wheatgrass, slimstem muhly, black sagebrush, and threetip sagebrush. The extent of Sandberg bluegrass and threetip sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annuals will invade. The potential plant community produces about 700 pounds of air-dry vegetation per acre in normal years. Production ranges from 550 pounds in favorable years to 350 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is poorly suited to range seeding, mechanical range renovation, and stockwater pond development. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of droughtiness and the depth to bedrock.

This unit is in capability subclass VIIe, nonirrigated. The Boyle soil is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site, and the Boyle, thin solum, soil is in the Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

114—Boyle, thin solum-Breece-Cathedral complex, 0 to 30 percent slopes

This map unit is on mountain ridges and foothills. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Boyle gravelly loam, 3 to 15 percent slopes; 30 percent Breece sandy loam, 0 to 3 percent slopes; and 20 percent Cathedral gravelly loam, 6 to 30 percent slopes. The Boyle and Cathedral soils are on side slopes, and the Breece soil is on alluvial fans and in draws. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop on hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle soil is very shallow and is well drained. It formed in very gravelly loamy residuum derived from granite. Typically, the surface layer is dark brown gravelly loam about 4 inches thick. The subsoil is brown very gravelly sandy clay loam about 4 inches thick. Semiconsolidated granite is at a depth of 8 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Breece soil is very deep and is well drained. It formed in loamy alluvium derived from granite. Typically, the upper 5 inches of the surface layer is dark brown sandy loam. The lower 20 inches of the surface layer is dark brown gravelly sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sandy loam.

Permeability is moderately rapid in the Breece soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Cathedral soil is shallow and well drained. It formed in very gravelly loamy residuum and colluvium derived from granite. Typically, the surface layer is brown gravelly loam about 7 inches thick. The underlying material is brown very gravelly sandy loam about 6 inches thick. Consolidated granite is at a depth of 13 inches.

Permeability is moderately rapid in the Cathedral soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Boyle soil is mainly bluebunch wheatgrass, slimstem muhly, black sagebrush, and threetip sagebrush. The extent of Sandberg bluegrass and threetip sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annuals will invade. The potential plant community produces about 550 pounds of air-dry vegetation per acre in normal years. Production ranges from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Breece soil is mainly bluebunch wheatgrass, Idaho fescue, prairie junegrass, Griffith wheatgrass, and big sagebrush. The extent of blue grama and big sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Cathedral soil is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years.

Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Boyle and Cathedral soils are poorly suited to stockwater ponds because of the depth to bedrock and the slope. They are poorly suited to range seeding and mechanical range renovation because of droughtiness and the hazard of water erosion. The Breece soil is moderately well suited to range seeding and mechanical range renovation. The hazard of wind erosion is the main limitation. The Breece soil is poorly suited to stockwater ponds because of the potential for seepage.

If range seeding is conducted on the Breece soil, leaving an adequate cover of residue on the surface after planting can reduce the hazard of erosion. Mechanical range renovation on the Breece soil may not be economically feasible because of the coarse texture of the surface layer.

The Boyle and Cathedral soils are poorly suited to windbreaks and environmental plantings because of the depth to bedrock and the droughtiness. The Breece soil is moderately suited. The main limitation is the droughtiness. These plantings should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. Windbreaks should be planted at a right angle to the prevailing winds.

The Boyle and Cathedral soils are in capability subclass VIIe, nonirrigated, and the Breece soil is in capability subclass IVe, nonirrigated. The Boyle soil is in the Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site; the Breece soil is in the Loamy, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site; and the Cathedral soil is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

115—Boyle, very stony-Boyle, thin solum-Lininger complex, 20 to 45 percent slopes

This map unit is on foothills and mountain ridges. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 45 percent Boyle very cobbly loam, very stony, 30 to 45 percent slopes; 30 percent Boyle gravelly loam, thin solum, 30 to 45 percent slopes; and 20 percent Lininger loam, 20 to 35 percent slopes. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop on ridges. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle, very stony, soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite, gneiss, and schist. Typically, about 43 percent of the surface is covered with stones, cobbles, and gravel. The upper 3 inches of the surface layer is dark brown very cobbly loam. The lower 5 inches of the surface layer is dark brown very gravelly loam. The subsoil is dark brown very gravelly sandy clay loam about 8 inches thick. Semiconsolidated granite is at a depth of 16 inches.

Permeability is moderate in the Boyle, very stony, soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Boyle, thin solum, soil is very shallow and is well drained. It formed in very gravelly loamy residuum derived from granite, gneiss, and schist. Typically, the surface layer is dark brown gravelly loam about 3 inches thick. The upper 3 inches of the subsoil is dark brown very gravelly sandy clay loam. The lower 3 inches of the subsoil is dark yellowish brown very gravelly sandy clay loam. Semiconsolidated granite is at a depth of 9 inches.

Permeability is moderate in the Boyle, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Lininger soil is moderately deep and is well drained. It formed in loamy alluvium and colluvium derived from granite, gneiss, and schist. Typically, the upper part of the surface layer is dark brown loam about 4 inches thick. The lower part of the surface layer is dark brown sandy clay loam about 9 inches thick. The upper 13 inches of the subsoil is brown sandy clay loam. The lower part of the subsoil is brown gravelly sandy clay loam about 12 inches

thick. Semiconsolidated granite is at a depth of 38 inches.

Permeability is moderate in the Lininger soil. The available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Boyle soils is mainly bluebunch wheatgrass, needleandthread, spike fescue, and true mountainmahogany. The extent of threadleaf sedge and juniper increases when the condition of the range begins to deteriorate. Broom snakeweed and plains pricklypear will invade if the range condition continues to deteriorate. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,150 pounds in favorable years to 550 pounds in unfavorable years.

The potential plant community on the Lininger soil is mainly bluebunch wheatgrass, Idaho fescue, prairie junegrass, Griffith wheatgrass, and big sagebrush. The extent of blue grama and big sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds. The main limitations are the slope and the depth to bedrock. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Boyle soils are in capability subclass VIIe, nonirrigated, and the Lininger soil is in capability subclass VIe, nonirrigated. The Boyle soils are in the Rocky Hills, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site, and the Lininger soil is in the Loamy, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

116—Boyle-Lininger-Boyle, thin solum, complex, 3 to 45 percent slopes

This map unit is on foothills and mountain ridges. The native vegetation consists mainly of grasses and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Boyle gravelly loam, 3 to 15 percent slopes; 20 percent Lininger loam, 10 to 20 percent slopes; and 20 percent Boyle gravelly loam, thin solum, 20 to 45 percent slopes. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Cathedral soil and rock outcrop on side slopes of hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite, schist, and gneiss. Typically, the surface layer is dark brown gravelly loam about 5 inches thick. The upper 5 inches of the subsoil is dark brown very gravelly sandy clay loam. The lower 4 inches also is dark brown very gravelly sandy clay loam. Semiconsolidated granite is at a depth of 14 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Lininger soil is moderately deep and is well drained. It formed in loamy alluvium and colluvium derived from granite, schist, and gneiss. Typically, the surface layer is dark brown loam about 3 inches thick. The upper 6 inches of the subsoil is dark brown sandy clay loam. The next 11 inches of the subsoil is brown sandy clay loam. The lower 2 inches of the subsoil is brown gravelly sandy clay loam. Semiconsolidated gneiss is at a depth of 22 inches.

Permeability is moderate in the Lininger soil. The available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Boyle, thin solum, soil is very shallow and is well drained. It formed in very gravelly loamy residuum derived from granite, gneiss, and schist. Typically, the surface layer is dark brown gravelly loam about 3 inches thick. The subsoil is brown very gravelly sandy

clay loam about 3 inches thick. Semiconsolidated granite is at a depth of 6 inches.

Permeability is moderate in the Boyle, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Boyle soil is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Lininger soil is mainly bluebunch wheatgrass, Idaho fescue, prairie junegrass, Griffith wheatgrass, and big sagebrush. The extent of blue grama and big sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Boyle, thin solum, soil is mainly bluebunch wheatgrass, slimstem muhly, black sagebrush, and threetip sagebrush. The extent of Sandberg bluegrass and threetip sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 700 pounds of air-dry vegetation per acre in normal years. Production ranges from 550 pounds in favorable years to 350 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds. The main limitations are the slope and the depth to bedrock. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Boyle soils are in capability subclass VIIe, nonirrigated, and the Lininger soil is in capability subclass VIe, nonirrigated. The Boyle soil is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site; the Lininger soil is in the Loamy, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site; and the Boyle, thin solum, soil is in the Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

117—Boyle-Rock outcrop-Cathedral complex, 5 to 45 percent slopes

This map unit is on foothills and mountain ridges. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Boyle gravelly loam, 5 to 15 percent slopes; 30 percent Rock outcrop; and 20 percent Cathedral gravelly loam, 10 to 20 percent slopes. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Lininger soils on the side slopes of ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite. Typically, the surface layer is dark brown gravelly loam about 7 inches thick. The subsoil is brown very gravelly sandy clay loam about 8 inches thick. Semiconsolidated granite is at a depth of about 15 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop consists of areas of exposed granite bedrock.

The Cathedral soil is shallow and well drained. It formed in very gravelly loamy residuum and colluvium derived from granite. Typically, the surface layer is dark brown gravelly loam about 7 inches thick. The

underlying material is yellowish brown very gravelly sandy loam. It is about 6 inches thick. Consolidated granite is at a depth of 13 inches.

Permeability is moderately rapid in the Cathedral soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Boyle and Cathedral soils is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds. The main limitations are the slope, the Rock outcrop, and the depth to bedrock. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Boyle and Cathedral soils are in capability subclass VIIe, nonirrigated, and the Rock outcrop is in capability subclass VIIIs. This unit is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

118—Boyle-Lininger association, 1 to 15 percent slopes

This map unit is on foothills and mountain ridges. The native vegetation consists mainly of grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 55 percent Boyle gravelly loam, 10 to 15 percent slopes, and 30 percent Lininger loam, 1 to 10 percent slopes. The Boyle soil is on the upper part of the slopes, and the Lininger soil is on the lower part of the slopes. The two soils could have been mapped separately at the scale used, but for the purposes of this survey they were mapped together because they have similar management requirements.

Included in mapping are small areas of Breece fine sandy loam on alluvial fans and in draws and Cathedral gravelly sandy loam on side slopes of ridges and hills. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Boyle soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite. Typically, the surface layer is dark brown gravelly loam about 4 inches thick. The subsoil is brown very gravelly sandy clay loam about 10 inches thick. Semiconsolidated granite is at a depth of 14 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Lininger soil is moderately deep and is well drained. It formed in loamy alluvium derived from granite, schist, and gneiss. Typically, the surface layer is dark brown loam about 4 inches thick. The upper 4 inches of the subsoil is dark brown sandy clay loam. The next part is brown sandy clay loam about 7 inches thick. The lower 10 inches is brown gravelly sandy clay loam. Semiconsolidated granite is at a depth of 25 inches.

Permeability is moderate in the Lininger soil. The available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Boyle soil is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Lininger soil is mainly bluebunch wheatgrass, Idaho fescue, prairie junegrass, Griffith wheatgrass, and big sagebrush. The extent of blue grama and big sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom

snakeweed and plains pricklypear will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This unit is poorly suited to stockwater ponds. The main limitation is the depth to bedrock. The Boyle soil is poorly suited to range seeding and mechanical range renovation because of droughtiness. The Lininger soil is moderately well suited to range seeding or mechanical range renovation. If range seeding or mechanical range renovation is conducted on the Lininger soil, the hazard of water erosion is a concern. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

The Boyle soil is poorly suited to windbreaks and environmental plantings because of the droughtiness and the depth to bedrock. The Lininger soil is moderately suited to these uses. The low annual precipitation and the droughtiness are the main limitations. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable.

The Boyle soil is in capability subclass VIIe, nonirrigated. The Lininger soil is in capability subclass IVe, nonirrigated. The Boyle soil is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site, and the Lininger soil is in the Loamy, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

119—Breece fine sandy loam, 0 to 10 percent slopes

This very deep, well drained soil is on alluvial fans and in draws. It formed in loamy alluvium derived from granite. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Trimad and Poposhia soils on knolls and alluvial fans. These areas make up about 15 percent or less of the total acreage. The percentage varies from one delineation to another.

Typically, the upper 4 inches of the surface layer of the Breece soil is brown fine sandy loam. The lower part of the surface layer is dark brown gravelly sandy loam about 19 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown gravelly sandy loam.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland, irrigated grass hayland, or wildlife habitat.

This unit is moderately well suited to irrigated grass hay. The main limitation is droughtiness. Frequent applications of irrigation water are necessary because of the limited available water capacity. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients.

The potential plant community is mainly bluebunch wheatgrass, Idaho fescue, prairie junegrass, Griffith wheatgrass, and big sagebrush. The extent of blue grama and big sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible,

however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. The hazard of water erosion also is a concern in areas that have slopes of more than 6 percent. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and the droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

120—Bresser sandy loam, 0 to 3 percent slopes

This very deep, well drained soil is on terraces. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Altvan fine sandy loam. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Bresser soil is dark grayish brown sandy loam about 15 inches thick. The subsoil is grayish brown and brown sandy clay loam about 22 inches thick. The substratum to a depth of 60 inches or more is grayish brown and pale brown loamy coarse sand.

Permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, thickspike wheatgrass, and prairie sandreed. The extent of blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

121—Cantle loam, 0 to 3 percent slopes

This very deep, poorly drained soil is on flood plains. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature

is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Evanston loam on alluvial fans, hills, and terraces and Tieside loam on side slopes of hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the upper part of the surface layer of the Cantle soil is brown loam about 7 inches thick. The lower part of the surface layer is dark brown loam about 9 inches thick. The upper 16 inches of the underlying material is brown silt loam. The lower part of the underlying material to a depth of 60 inches or more is brown silt loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to occasional long periods of flooding in April and May. Depth to the seasonal high water table is 6 to 18 inches from April through June.

This unit is used mainly as rangeland, hayland, or wildlife habitat.

This unit is moderately well suited to hay. The main limitation is the wetness. The careful planning of irrigation is needed to avoid raising the level of the water table. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. The wetness limits the kinds of plants that can be grown. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff.

The potential plant community is mainly big bluestem, indiangrass, prairie cordgrass, willow, and little bluestem. The extent of western wheatgrass, sage, and willows increases when the condition of the range begins to deteriorate. Kentucky bluegrass and annuals will invade if the range condition continues to deteriorate. The potential plant community produces about 4,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 5,000 pounds in favorable years to 3,500 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Deferring grazing until the soil surface is firm helps to prevent compaction and maintains productivity.

This soil is well suited to stockwater ponds. Pits dug to a depth below the level of the water table in the fall help to provide water for livestock throughout the year. This soil is poorly suited to mechanical range renovation and range seeding. The main limitation is the wetness in the spring and summer, which limits the use of equipment. If range seeding is conducted, plant species should be carefully selected.

This unit is moderately suited to windbreaks and environmental plantings. The main limitation is the wetness. Trees and shrubs that can tolerate wetness should be planted. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize the competition from weeds. Weed barriers may be used to minimize competition. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVw, nonirrigated and irrigated. It is in the Subirrigated, 15- to 17-inch precipitation zone, Southern Plains range site.

122—Cantle-Merden, saline, complex, 0 to 3 percent slopes

This map unit is on flood plains. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 60 percent Cantle loam, 0 to 3 percent slopes, and 30 percent Merden silty clay loam, 0 to 3 percent slopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Chalkcreek loam on alluvial fans and in swales. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Cantle soil is very deep and is somewhat poorly drained. It formed in loamy alluvium derived from various sources. Typically, the upper part of the surface layer is very dark grayish brown loam about 10 inches thick. The lower 26 inches of the surface layer is dark grayish brown loam. The underlying material to a depth of 60 inches or more is grayish brown gravelly sandy loam.

Permeability is moderate in the Cantle soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to occasional long periods of flooding in April and May. Depth to the

seasonal high water table is 6 to 18 inches from April through July.

The Merden soil is very deep and is poorly drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is dark brown, slightly saline silty clay loam about 15 inches thick. The subsoil also is dark brown, slightly saline silty clay loam. It is about 8 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly saline silty clay loam that has many medium distinct dark yellowish brown mottles.

Permeability is slow in the Merden soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to frequent long periods of flooding in April and May. Depth to the seasonal high water table is 6 to 18 inches from April through July.

This unit is used mainly as hayland, rangeland, or wildlife habitat.

This unit is moderately suited to hay. The main limitations are the salinity of the Merden soil and the wetness of both soils. The careful planning of irrigation is needed to avoid raising the level of the water table. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. The salinity of the Merden soil limits hay yields and the kinds of plants that can be grown. The wetness of both soils also limits the kinds of plants that can be grown. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests.

The potential plant community on the Cantle soil is mainly big bluestem, indiangrass, little bluestem, willow, and prairie cordgrass. The extent of western wheatgrass, sedges, and willows increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, Kentucky bluegrass and annuals will invade. The potential plant community produces about 4,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 5,000 pounds in favorable years to 3,500 pounds in unfavorable years.

The potential plant community on the Merden soil is mainly alkali sacaton, western wheatgrass, fourwing saltbush, and inland saltgrass. The extent of inland saltgrass and greasewood increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annuals will invade. The potential plant community produces about 4,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 4,500 pounds in favorable years to 3,000 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Deferring grazing until the soil surface is firm helps to prevent compaction and maintains productivity.

This unit is well suited to stockwater ponds. Pits dug to a depth below the level of the water table in the fall help to provide water for livestock throughout the year. This unit is moderately suited to mechanical range renovation and range seeding. The main limitation is the wetness. If range seeding is conducted, plant species should be carefully selected. The salinity of the Merden soil should also be considered when plants are selected for seeding. The wetness limits the use of equipment during spring and summer.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the salinity of the Merden soil and the wetness of both soils. Trees and shrubs that can tolerate wetness and salinity should be planted. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may also be used to minimize competition. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVw, nonirrigated and irrigated. The Cantle soil is in the Subirrigated, 15- to 17-inch precipitation zone, Southern Plains range site, and the Merden soil is in the Saline Subirrigated, 15- to 17-inch precipitation zone, Southern Plains range site. The soils in this map unit are hydric soils.

123—Cathedral-Boyle complex, 10 to 30 percent slopes

This map unit is on mountain ridges and foothills. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Cathedral gravelly sandy loam and 35 percent Boyle gravelly loam. The two soils occur as areas so intricately intermingled that it

was not practical to map them separately at the scale used.

Included in mapping are small areas of Boyle soils that have a thin solum. These areas are on side slopes of ridges. They make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Cathedral soil is shallow and well drained. It formed in very gravelly loamy residuum and colluvium derived from granite, gneiss, and schist. Typically, the surface layer is dark brown gravelly sandy loam about 7 inches thick. The underlying material is yellowish brown extremely gravelly sandy loam. It is about 6 inches thick. Consolidated granite is at a depth of 13 inches.

Permeability is moderately rapid in the Cathedral soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Boyle soil is shallow and well drained. It formed in very gravelly loamy residuum derived from granite, gneiss, and schist. Typically, the surface layer is dark brown gravelly loam about 7 inches thick. The upper part of the subsoil is brown very gravelly sandy clay loam about 6 inches thick. The lower part is yellowish brown very gravelly sandy clay loam about 2 inches thick. Semiconsolidated granite is at a depth of 15 inches.

Permeability is moderate in the Boyle soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly bluebunch wheatgrass, slimstem muhly, threetip sagebrush, and winterfat. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope and the depth to bedrock. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

This unit is in capability subclass VIIe, nonirrigated. It is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

124—Chalkcreek Family, 0 to 3 percent slopes

This very deep, somewhat poorly drained soil is on valley floors and alluvial fans and in swales. It formed in loamy alluvium derived from red sandstone. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Dalecreek loam on terraces and alluvial fans and Merden silty clay loam in swales and backswamps. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Chalkcreek Family is reddish brown loam about 6 inches thick. The upper part of the subsoil is reddish brown silt loam about 24 inches thick. The lower part of the subsoil to a depth of 60 inches or more also is reddish brown silt loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 36 to 48 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to rare flooding. Depth to the seasonal high water table is 3 to 4 feet from April through August. The water table is the result of irrigation on this soil and/or on adjacent soils.

This unit is used mainly as irrigated hayland. Some areas are used as rangeland or wildlife habitat.

This unit is well suited to irrigated hay. Sprinkler and contour ditch irrigation methods are suitable. The careful planning of irrigation is needed to avoid raising the level of the water table. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent

overirrigation and the leaching of plant nutrients. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests.

The potential plant community is mainly big bluestem, indiangrass, prairie cordgrass, and little bluestem. The extent of western wheatgrass, sedges, and willows increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, Kentucky bluegrass and annuals will invade. The potential plant community produces about 4,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 5,000 pounds in favorable years to 3,500 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Deferring grazing until the soil surface is firm helps to prevent compaction and maintains productivity.

This unit is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. Pits dug to a depth below the water table can provide water for livestock. Because of the fluctuating level of the water table, these pits may not provide water throughout the year. An onsite study should be conducted to determine the level of the water table in the soil at various times of the year. The soil will not hold water above the level of the water table for a long period of time because of the potential for seepage. This unit is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is well suited to windbreaks and environmental plantings. If water is available, trees and shrubs should be irrigated until they are well established. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVw, nonirrigated and irrigated. It is in the Subirrigated, 15- to 17-inch precipitation zone, Southern Plains range site.

125—Chalkcreek-Tieside loams, 0 to 6 percent slopes

This map unit is on hills and in adjacent swales. The native vegetation consists mainly of grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Chalkcreek loam, 0 to 3 percent slopes, and 40 percent Tieside loam, 3 to 6 percent slopes. The Chalkcreek soil is in swales, and the Tieside soil is on hillslopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop on escarpments. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Chalkcreek soil is very deep and is well drained. It formed in loamy alluvium derived from red sandstone. Typically, the surface layer is reddish brown loam about 6 inches thick. The upper part of the subsoil is red silt loam about 17 inches thick. The lower part of the subsoil to a depth of 60 inches or more is light reddish brown silt loam.

Permeability is moderate in the Chalkcreek soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to rare flooding.

The Tieside soil is shallow and well drained. It formed in loamy residuum and colluvium derived from red sandstone. Typically, the surface layer is reddish brown loam about 3 inches thick. The subsoil is reddish brown and yellowish red loam about 16 inches thick. Semiconsolidated sandstone is at a depth of 19 inches.

Permeability is moderate in the Tieside soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Chalkcreek soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential

plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Tieside soil is mainly bluebunch wheatgrass, little bluestem, needleandthread, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

The Tieside soil is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the depth to bedrock. The Chalkcreek soil is moderately well suited to stockwater ponds. The main limitation is the moderate potential for seepage. The Chalkcreek soil is well suited to range seeding and mechanical range renovation. Mechanical range renovation may be used in areas of the Chalkcreek soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

The Tieside soil is poorly suited to windbreaks and environmental plantings because of the depth to bedrock. The Chalkcreek soil is moderately well suited. The low annual precipitation is the main limitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Chalkcreek soil is in capability subclass IVe, nonirrigated. The Tieside soil is in capability subclass VIIe, nonirrigated. The Chalkcreek soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Tieside soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

126—Chivington loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and terraces and in draws. It formed in clayey alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Evanston loam on terraces and Ipson loam on knolls. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Chivington soil is dark brown loam about 3 inches thick. The upper 11 inches of the subsoil is dark brown clay. The next 15 inches is brown clay. The next 4 inches is light yellowish brown clay. The lower part of the subsoil to a depth of 60 inches or more also is light yellowish brown clay.

Permeability is slow. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly western wheatgrass, green needlegrass, and winterfat. The extent of blue grama and buffalograss increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is well suited to stockwater ponds, mechanical range renovation, and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and the clayey texture.

Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage in the year before the trees are planted.

This unit is in capability subclass IVe, nonirrigated. It is in the Clayey, 15- to 17-inch precipitation zone, Southern Plains range site.

127—Cowestglen fine sandy loam, 0 to 3 percent slopes

This very deep, well drained soil is on flood plains. It formed in stratified loamy alluvium derived from various sources. The native vegetation consists mainly of trees, shrubs, and grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Evanston loam and Chivington loam on alluvial fans and terraces. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Cowestglen soil is brown fine sandy loam about 7 inches thick. The upper 47 inches of the underlying material is brown coarse sandy loam stratified with thin lenses of silty clay loam. The lower part of the underlying material to a depth of 60 inches or more is dark grayish brown sandy loam.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe. This soil is subject to occasional very brief periods of flooding during the months of April and May.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

This unit is moderately well suited to irrigated hay. The main limitation is droughtiness. Frequent applications of irrigation water are necessary because of the limited available water capacity. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests.

The potential plant community is mainly needleandthread, western wheatgrass, Indian ricegrass, little bluestem, and eastern cottonwood. The extent of woody species increases when the condition of the range begins to deteriorate. Western ragweed and Kentucky bluegrass will invade if the range condition continues to deteriorate. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,000 pounds in favorable years to 1,800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage in the year before the trees are planted.

This unit is in capability subclass IVe, nonirrigated and irrigated. It is in the Lowland, 15- to 17-inch precipitation zone, Southern Plains range site.

128—Dalecreek-Kovich, cool, loams, 0 to 9 percent slopes

This map unit is on flood plains. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the

average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Dalecreek loam, 0 to 9 percent slopes, and 45 percent Kovich, cool, loam, 0 to 9 percent slopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Merden silty clay loam. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Dalecreek soil is very deep and is moderately well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 10 inches thick. The underlying material to a depth of 60 inches or more is very dark gray gravelly sandy clay loam.

Permeability is moderate in the Dalecreek soil. The available water capacity is high. The effective rooting depth is 36 to 48 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to rare flooding. Depth to the seasonal high water table is 36 to 48 inches from April through July. During the remainder of the year, the water table is at a depth of 40 to 60 inches.

The Kovich, cool, soil is very deep and is poorly drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsoil also is very dark grayish brown loam. It is about 20 inches thick. The substratum to a depth of 60 inches or more is dark brown gravelly sandy clay loam.

Permeability is moderate in the Kovich, cool, soil. The available water capacity is high. The effective rooting depth is 6 to 18 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to rare flooding. Depth to the seasonal high water table is 6 to 18 inches in April through July. During the remainder of the year, the water table is at a depth of 18 to 36 inches.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

This unit is moderately well suited to irrigated hay. The main limitation is the wetness. The careful planning of irrigation is needed to avoid raising the level of the water table. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. The wetness limits the kinds of plants that can be grown. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff.

The potential plant community on this unit is mainly basin wildrye, tufted hairgrass, slender wheatgrass, western wheatgrass, and shrubby cinquefoil. The extent of sedges and willows increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, Kentucky bluegrass and willows will invade. The potential plant community produces about 4,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 4,500 pounds in favorable years to 3,300 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Deferring grazing until the soil surface is firm helps to prevent compaction and maintains productivity.

This unit is well suited to stockwater ponds. Pits dug to a depth below the level of the water table in the fall help to provide water for livestock throughout the year. This unit is moderately well suited to mechanical range renovation and range seeding. The main limitation is the wetness in the spring and summer, which limits the use of equipment. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the wetness. Trees and shrubs that can tolerate wetness should be planted. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVw, nonirrigated and irrigated. It is in the Subirrigated, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

The soils in this unit are hydric soils.

129—Dix-Altvan complex, 10 to 30 percent slopes

This map unit is on hills and adjacent terraces and alluvial fans. The native vegetation consists mainly of

grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 50 percent Dix gravelly loam, 15 to 30 percent slopes, and 35 percent Altvan loam, 10 to 15 percent slopes. The Dix soil is on hills, and the Altvan soil is on hillcrests, terraces, and alluvial fans. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Ascalon loam and Wages loam on terraces and alluvial fans. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Dix soil is very deep and is excessively drained. It formed in sandy alluvium derived from various sources. Typically, 20 percent of the surface is covered with gravel. The surface layer is dark brown gravelly loam about 10 inches thick. The upper 5 inches of the underlying material is yellowish brown extremely gravelly sand. The lower part of the underlying material to a depth of 60 inches or more is yellowish brown extremely gravelly coarse sand.

Permeability is very rapid in the Dix soil. The available water capacity is very low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Altvan soil is very deep and is well drained. It formed in loamy alluvium over sandy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper part of the subsoil is yellowish brown sandy clay loam about 16 inches thick. The lower part to a depth of 60 inches or more is yellowish brown very gravelly sand.

Permeability is moderate in the upper part of the subsoil in the Altvan soil and very rapid in the lower part. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

The potential plant community on the Dix soil is mainly little bluestem, bluebunch wheatgrass, Indian ricegrass, western wheatgrass, and needleandthread. The extent of blue grama and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 600 pounds of air-dry vegetation per acre in normal years. Production ranges from 900 pounds in favorable years to 400 pounds in unfavorable years.

The potential plant community on the Altvan soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This unit is poorly suited to stockwater ponds because of the potential for seepage and the slope. The Dix soil is poorly suited to range seeding and mechanical range renovation. The gravelly surface layer and the slope are the main limitations. The Altvan soil is moderately suited to range seeding and mechanical range renovation. The hazard of water erosion is the main limitation. Mechanical range renovation may be used in areas of the Altvan soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

The Dix soil is poorly suited to irrigated hay. The main limitations are the slope, the hazard of water erosion, and droughtiness. The gravelly surface layer also is a limitation. The Altvan soil is moderately suited to irrigated hay. The main limitations are the hazard of water erosion and the droughtiness. In some areas where the Dix and Altvan soils are extremely intermingled, the entire unit is poorly suited to hay. Frequent irrigation is needed because of the droughtiness. A sprinkler system is the best method of irrigation. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The Dix soil is poorly suited to windbreaks and environmental plantings because of the slope and the droughtiness. The Altvan soil is moderately well suited. The low annual precipitation is the main limitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Dix soil is in capability subclass VIIs, nonirrigated, and VIs, irrigated. The Altvan soil is in capability subclass IVe, nonirrigated and irrigated. The Dix soil is in the Gravelly, 15- to 17-inch precipitation zone, Southern Plains range site, and the Altvan soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

130—Embry loamy fine sand, 2 to 10 percent slopes

This very deep, well drained soil is on terraces, hills, and alluvial fans. It formed in loamy alluvium and eolian deposits derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Turnercrest fine sandy loam on hills and alluvial fans. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Embry soil is brown loamy fine sand about 10 inches thick. The upper 17 inches of the underlying material is yellowish brown fine sandy loam. The lower part of the underlying material to a depth of 60 inches or more is light yellowish brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, and thickspike wheatgrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is poorly suited to mechanical range renovation and range seeding. Mechanical range renovation may not be economically feasible because of the coarse texture of the surface layer. The main limitation affecting seeding is the hazard of wind erosion. Tillage for range improvement is not recommended. Interseeding and preparing the seedbed by band spraying of herbicides are suitable practices.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

131—Evanston loam, 0 to 6 percent slopes

This very deep, well drained soil is on terraces, alluvial fans, and hills. It formed in loamy alluvium derived from various sources. The native vegetation is mainly grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Ipson loam on knolls. These areas make up about 10 percent of

the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Evanston soil is brown loam about 3 inches thick. The upper part of the subsoil is brown clay loam about 12 inches thick. The next part is yellowish brown and very pale brown loam about 11 inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown sandy clay loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as nonirrigated cropland.

This unit is moderately well suited to nonirrigated crops. The main limitations are the low annual precipitation and a short growing season. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by leaving the surface rough after tillage, stripcropping at a right angle to the prevailing winds, and maintaining crop residue on the surface.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is moderately well suited to stockwater ponds. The main limitation is the moderate potential for seepage. The soil is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

132—Evanston-Weed complex, 3 to 35 percent slopes

This map unit is on hills and adjacent terraces, on alluvial fans, and in draws. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 70 percent Evanston gravelly sandy loam, 9 to 35 percent slopes, and 25 percent Weed sandy loam, 3 to 15 percent slopes. The Evanston soil is on hills and terraces, and the Weed soil is on toeslopes, footslopes, and alluvial fans and in draws. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Trimad gravelly loam and Blazon silt loam on hills and ridges. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is brown gravelly sandy loam about 5 inches thick. The upper 10 inches of the subsoil is dark brown gravelly clay loam. The next 12 inches is dark grayish brown gravelly sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown gravelly sandy clay loam.

Permeability is moderately slow in the Evanston soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Weed soil is very deep and is well drained. It formed in loamy alluvium derived from various

sources. Typically, the surface layer is brown sandy loam about 5 inches thick. The upper 9 inches of the subsoil is brown sandy clay loam. The next 14 inches is dark brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is dark brown sandy clay loam.

Permeability is moderately slow in the Weed soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

The Evanston soil is poorly suited to stockwater ponds, mechanical range renovation, and range seeding because of the slope. The hazard of water erosion is also a concern. The use of tillage for range improvement in areas of the Evanston soil is not recommended.

The Weed soil is moderately well suited to stockwater ponds. The main limitations are the moderate potential for seepage and the slope. The Weed soil is moderately suited to range seeding and mechanical range renovation. The main limitations are the hazards of wind erosion and water erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. In areas that have slopes of more than 6 percent, tilling on the contour can reduce the hazard of water erosion. Mechanical range renovation may be used in areas of the Weed soil where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation in areas of the Evanston soil is the slope. The Weed soil has few limitations affecting these uses. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Tillage is not recommended in areas that have slopes of more than 15 percent, however, because of the hazard of water erosion. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. Areas that have slopes of more than 25 percent are not recommended for these plantings.

The Evanston soil is in capability subclass VIe, nonirrigated. The Weed soil is in capability subclass IVe, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

133—Evanston-Weed-Trimad loams, 3 to 15 percent slopes

This map unit is on hills and terraces, on adjacent alluvial fans, and in draws. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 35 percent Evanston loam, 3 to 15 percent slopes; 35 percent Weed loam, 3 to 6 percent slopes; and 25 percent Trimad loam, 6 to 15 percent slopes. The Evanston soil is on terraces, alluvial fans, and hills; the Weed soil is on alluvial fans and in draws; and the Trimad soil is on hills. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Ipson gravelly loam on knolls, ridges, and alluvial fans. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 3 inches thick. The upper 9 inches of the subsoil is brown clay loam. The next part of the subsoil is very pale gray loam to a depth of 27 inches. The

lower part of the subsoil to a depth of 60 inches or more is very pale brown gravelly sandy loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Weed soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 10 inches of the subsoil is dark brown clay loam. The next 8 inches is dark brown sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more also is dark brown sandy clay loam.

Permeability is moderately slow in the Weed soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 8 inches of the subsoil is brown very gravelly loam. The next 12 inches is yellowish brown very gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is very pale brown very gravelly loam.

Permeability is moderately rapid in the Trimad soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

The Evanston and Trimad soils are poorly suited to stockwater ponds because of the potential for seepage. The Weed soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation.

The Evanston and Trimad soils are moderately well suited to mechanical range renovation and range seeding. The main limitations are the hazards of wind erosion and water erosion. The Weed soil is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. In areas that have slopes of more than 6 percent, tilling along the contour can reduce the hazard of water erosion.

The Evanston and Weed soils are moderately well suited to windbreaks and environmental plantings. The Trimad soil is moderately suited. The main limitations in areas of the Trimad soil are the gravel in the subsoil and droughtiness. The low annual precipitation should be considered when these plantings are planned on any of these soils. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable.

The Evanston and Weed soils are in capability subclass IVe, nonirrigated. The Trimad soil is in capability subclass VIs, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

134—Evanston-Ipson association, 3 to 20 percent slopes

This map unit is on terraces and alluvial fans and adjacent hills. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 60 percent Evanston loam, 3 to 6 percent slopes, and 25 percent Ipson loam, 6 to 20 percent slopes. The Evanston soil is on alluvial fans

and terraces, and the Ipson soil is on hills. The two soils could have been mapped separately at the scale used, but for the purposes of this survey they were mapped together because they have similar management requirements.

Included in mapping are small areas of Trimad gravelly loam on knolls. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 7 inches thick. The upper 10 inches of the subsoil is dark brown sandy clay loam. The next 13 inches is brown sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is brown gravelly sandy clay loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Ipson soil is very deep and is well drained. It is formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 14 inches of the subsoil is yellowish brown very gravelly sandy clay loam. The next 23 inches also is yellowish brown very gravelly sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly loam. In some areas the surface layer is gravelly loam.

Permeability is moderate in the Ipson soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. Broom snakeweed and cheatgrass will invade if the range condition continues to deteriorate. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

The Evanston soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The Ipson soil is poorly suited to stockwater ponds because of the potential for seepage.

The Evanston soil is well suited to range seeding and mechanical range renovation. The Ipson soil is moderately suited to these practices. The main limitations in areas of the Ipson soil are the slope and the hazard of water erosion. Range seeding is limited in areas where the Ipson soil has a gravelly surface layer. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. In areas that have slopes of more than 6 percent, tilling along the contour can reduce the hazard of water erosion. Tillage is not recommended in areas that have slopes of more than 15 percent because of the hazard of water erosion.

The Evanston soil is moderately well suited to windbreaks and environmental plantings. The Ipson soil is moderately suited to these uses. The slope, droughtiness, and the very gravelly subsoil are the main limitations in areas of the Ipson soil. The low annual precipitation should be considered when these plantings are planned on either of these soils. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable.

The Evanston soil is in capability subclass IVe, nonirrigated. The Ipson soil is in capability subclass VIe, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

135—Haverdad-Clarkelen-Kovich, warm, complex, 0 to 3 percent slopes

This map unit is on flood plains. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 40 percent Haverdad sandy clay loam, 0 to 3 percent slopes; 30 percent Clarkelen sandy loam, 0 to 3 percent slopes; and 20 percent Kovich loam, 0 to 3 percent slopes. The Haverdad and Clarkelen soils are in all areas of the flood plain except the backswamps, and the Kovich soil is in all areas of the flood plain including the backswamps. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Merden silty clay loam. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Haverdad soil is very deep and is well drained. It formed in stratified alluvium derived from various sources. Typically, the surface layer is grayish brown sandy clay loam about 7 inches thick. The upper part of the underlying material, to a depth of about 30 inches, is light brownish gray sandy clay loam stratified with thin lenses of sandy loam and loamy sand. The lower part of the underlying material to a depth of 60 inches or more is light brownish gray very gravelly sand.

Permeability is moderate in the upper part of the underlying material in the Haverdad soil and rapid in the lower part of the underlying material. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to occasional very brief periods of flooding from April through June.

The Clarkelen soil is very deep and is moderately well drained. It formed in stratified loamy alluvium derived from various sources. Typically, the surface layer is grayish brown sandy loam about 8 inches thick. The upper 29 inches of the underlying material is stratified pale brown and light brownish gray sandy loam, loamy sand, and gravelly sandy loam. The lower part to a depth of 60 inches or more is light brownish gray gravelly sandy loam stratified with thin lenses of sand and very gravelly sand.

Permeability is moderately rapid in the Clarkelen soil. The available water capacity is moderate. The effective rooting depth is 24 to 60 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe. This soil is subject to occasional very brief periods of flooding from April through June. Depth to the seasonal high water table is 24 to 60 inches from April through July.

The Kovich soil is very deep and is poorly drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 11 inches thick. The upper 15 inches of the underlying material is stratified brown and dark brown fine sandy loam and silt loam. The lower part to a depth of 60 inches or more is stratified brown fine sandy loam and sandy clay loam.

Permeability is moderate in the Kovich soil. The available water capacity is high. The effective rooting depth is 6 to 18 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to occasional very brief periods of flooding from April through June. Depth to the seasonal high water table is 6 to 18 inches from April through July.

This unit is used mainly for irrigated hay or as wildlife habitat.

The Haverdad soil is well suited to hay. The Clarkelen and Kovich soils are moderately well suited. The main limitation in areas of the Clarkelen soil is droughtiness. The main limitation in areas of the Kovich soil is the wetness. Frequent applications of irrigation water are necessary on the Clarkelen soil because of the limited available water capacity. Careful planning of irrigation is needed, however, to avoid raising the level of the water table, particularly in the Kovich soil. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Fertilizer is needed to ensure optimum growth of grasses and legumes.

The Haverdad and Clarkelen soils are moderately well suited to windbreaks and environmental plantings. The Kovich soil is only moderately suited to these plantings because of the wetness. Trees and shrubs that can tolerate wetness should be planted on the Kovich soil. If water is available, windbreaks on the Haverdad and Clarkelen soils should be irrigated until they are well established. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

The Haverdad and Clarkelen soils are in capability subclass IIIe, nonirrigated and irrigated. The Kovich soil is in capability subclass IVw, nonirrigated and irrigated.

136—Haverson loam, 0 to 3 percent slopes

This very deep, well drained soil is on flood plains and adjacent low terraces. It formed in stratified loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of riverwash and Clarkelen sandy loam. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Haverson soil is pale brown and light brownish gray loam about 12 inches thick. The underlying material to a depth of 60 inches or more is very fine sandy loam and loam stratified with thin lenses of sandy loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to rare flooding.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly western wheatgrass, big bluestem, little bluestem, needleandthread, and green needlegrass. The extent of western wheatgrass and silver sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, Kentucky bluegrass and annuals will invade. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The soil is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy Overflow, 15- to 17-inch precipitation zone, Southern Plains range site.

137—Ipson-Breece, dry-Evanston complex, 0 to 6 percent slopes

This map unit is on knolls, hills, terraces, and alluvial fans and in draws. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Ipson gravelly loam, 0 to 6 percent slopes; 30 percent Breece fine sandy loam, 0 to 3 percent slopes; and 20 percent Evanston loam, 0 to 6 percent slopes. The Ipson soil is on knolls and hills, the Breece soil is on alluvial fans and in draws, and the Evanston soil is on terraces and alluvial fans. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Cathedral gravelly sandy loam on side slopes of ridges and hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Ipson soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown gravelly loam about 3 inches thick. The upper part of the subsoil is brown very gravelly sandy clay loam about 9 inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown very gravelly sandy loam.

Permeability is moderate in the Ipson soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Breece soil is very deep and is well drained. It formed in loamy alluvium derived from granite.

Typically, the upper part of the surface layer is dark brown sandy loam about 5 inches thick. The lower part of the surface layer is dark brown gravelly sandy loam about 20 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sandy loam.

Permeability is moderately rapid in the Breece soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 7 inches thick. The upper part of the subsoil is yellowish brown clay loam about 12 inches thick. The lower part of the subsoil to a depth of 60 inches or more is pale brown loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as nonirrigated cropland.

The potential plant community on the Ipson and Evanston soils is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Breece soil is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

The Ipson and Breece soils are poorly suited to stockwater ponds because of the potential for seepage. The Evanston soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation.

The Ipson and Breece soils are moderately well suited to mechanical range renovation and range seeding. The main limitation in areas of the Ipson soil is the gravelly surface layer. The main limitation in areas of the Breece soil is the hazard of wind erosion. The Evanston soil is well suited to range seeding and mechanical range renovation. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible on the Breece soil because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to nonirrigated crops. The main limitations are the low annual precipitation and the hazard of wind erosion. The droughtiness of the Ipson and Breece soils and the gravelly surface layer of the Ipson soil are also limitations. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, leaving the soil surface rough, and maintaining a cover of crop residue on the surface after tillage.

The Evanston soil is moderately well suited to windbreaks and environmental plantings. The Ipson and Breece soils are moderately suited. The main limitations in areas of the Ipson soil are the droughtiness and the gravelly surface layer. The main limitation in areas of the Breece soil is the droughtiness. The low annual precipitation should be considered when these plantings are planned on any of these soils. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable.

This unit is in capability subclass IVe, nonirrigated. The Evanston and Ipson soils are in the Loamy, 15- to 17-inch precipitation zone, Southern Plains

range site, and the Breece soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

138—Ipson-Evanston complex, 6 to 30 percent slopes

This map unit is on hills and adjacent terraces and alluvial fans (fig. 2). The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Ipson gravelly loam, 10 to 30 percent slopes, and 40 percent Evanston loam, 6 to 15 percent slopes. The Ipson soil is on hills and alluvial fans, and the Evanston soil is on terraces, alluvial fans, and hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Poposhia silt loam on alluvial fans and hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Ipson soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is brown gravelly loam about 8 inches thick. The upper 6 inches of the subsoil is brown very gravelly sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability is moderate in the Ipson soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 7 inches thick. The upper 21 inches of the subsoil is brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is brown loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat. A few areas are used as nonirrigated cultivated cropland, but the soils are poorly suited to this use. The main limitations are the slope and the hazards of wind erosion and water erosion. A permanent vegetative cover is needed to reduce these hazards.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

The Ipson soil is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope. The severe potential for seepage also limits the development of stockwater ponds on the Ipson soil. The Evanston soil is moderately well suited to stockwater ponds. The slope and the moderate potential for seepage are the main limitations.

The Evanston soil is moderately well suited to range seeding and mechanical range renovation. Mechanical range renovation may be used in areas of the Evanston soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be along the contour.

The Evanston soil is moderately well suited to windbreaks and environmental plantings. The Ipson soil is moderately suited. The main limitations are the slope, the gravelly surface layer, and droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable.

The Ipson soil is in capability subclass VIe,

Figure 2.—A typical landscape in an area of Ipson-Evanston complex, 6 to 30 percent slopes. Developing properly located water sources for livestock can result in the effective use of these and similar large areas of open rangeland.

nonirrigated, and the Evanston soil is in capability subclass IVe, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

139—Ipson-Evanston-Rock outcrop complex, 0 to 30 percent slopes

This map unit is on hills, adjacent alluvial fans, and terraces. The native vegetation consists mainly of grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Ipson gravelly loam, 6 to 30 percent slopes; 25 percent Evanston loam, 0 to 15 percent slopes; and 20 percent Rock outcrop. The Ipson soil is on hills and alluvial fans; the Evanston soil is on alluvial fans, terraces, and hills; and the Rock outcrop is on hills. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Weed loam on alluvial fans and terraces and in draws. These

areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Ipson soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is brown gravelly loam about 8 inches thick. The upper part of the subsoil is brown very gravelly sandy clay loam about 6 inches thick. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability is moderate in the Ipson soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 9 inches thick. The upper 17 inches of the subsoil is yellowish brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Rock outcrop consists of areas of exposed conglomerate bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Evanston and Ipson soils is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Ipson soil is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope. The areas of Rock outcrop in this unit are also a limitation affecting range seeding and mechanical range renovation. Tillage for range improvement on the Ipson soil is not recommended. Interseeding and preparing the seedbed by band spraying of herbicides are suitable practices.

The Evanston soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. This soil is moderately well suited to range seeding and mechanical range renovation. The main limitation is the hazard of water erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be along the contour.

The Evanston soil is moderately well suited to windbreaks and environmental plantings. The Ipson soil is moderately suited. The main limitations are the slope, the gravelly surface layer, and droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. Areas that have slopes of more than 25 percent and areas of Rock outcrop should not be used for these plantings.

The Ipson soil is in capability subclass VIe, nonirrigated. The Evanston soil is in capability subclass IVe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Ipson and Evanston soils are in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

140—Ipson-Pinelli-Rock outcrop complex, 6 to 45 percent slopes

This map unit is on hills and ridges, adjacent alluvial fans, and foot slopes. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Ipson loam, 6 to 45 percent slopes; 25 percent Pinelli loam, 6 to 15 percent slopes;

and 20 percent Rock outcrop. The Ipson soil is on hills, ridges, and alluvial fans; the Pinelli soil is on alluvial fans and foot slopes; and the Rock outcrop is on hills. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Evanston loam on terraces and alluvial fans. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Ipson soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 9 inches thick. The upper 17 inches of the subsoil is brown very gravelly sandy clay loam. The next 14 inches is grayish brown very gravelly sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is grayish brown very gravelly sandy loam.

Permeability is moderate in the Ipson soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Pinelli soil is very deep and is well drained. It formed in clayey alluvium derived from various sources. Typically, the surface layer is dark brown loam about 7 inches thick. The upper 11 inches of the subsoil is brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is light brown clay loam.

Permeability is slow in the Pinelli soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop consists of areas of exposed conglomerate bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Ipson soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Pinelli soil is mainly needleandthread, western wheatgrass, bluebunch wheatgrass, and true mountainmahogany. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Ipson soil is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope. The associated areas of Rock outcrop also are limitations. The Pinelli soil is moderately well suited to stockwater ponds. The slope is the main limitation.

The Pinelli soil is moderately well suited to mechanical range renovation and range seeding. The hazard of water erosion is the main limitation. Mechanical range renovation may not be practical because of the number of shrubs growing on this soil. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

The Ipson soil is poorly suited to windbreaks and environmental plantings because of the slope and droughtiness. The Pinelli soil is moderately well suited. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. Areas that have slopes of more than 25 percent and areas of Rock outcrop should not be used for these plantings.

The Ipson soil is in capability subclass VIe, nonirrigated. The Pinelli soil is in capability subclass IVe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Ipson soil is in the Loamy, 15- to

17-inch precipitation zone, Southern Plains range site, and the Pinelli soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site.

141—Ipson-Trimad complex, 15 to 45 percent slopes

This map unit is on hills and adjacent alluvial fans. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Ipson loam, 15 to 30 percent slopes, and 30 percent Trimad gravelly loam, 20 to 45 percent slopes. The Ipson soil is on alluvial fans and hills, and the Trimad soil is on hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Evanston loam on alluvial fans. These areas make up about 20 percent of the total acreage. The percentage varies from one delineation to another.

The Ipson soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 7 inches thick. The upper 6 inches of the subsoil is yellowish brown very gravelly sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown very gravelly sandy loam.

Permeability is moderate in the Ipson soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown and brown gravelly loam about 10 inches thick. The subsoil to a depth of 60 inches or more is yellowish brown very gravelly sandy loam.

Permeability is moderately rapid in the Trimad soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. Broom snakeweed and cheatgrass will invade if the range condition continues to deteriorate. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope.

This unit is poorly suited to windbreaks and environmental plantings because of the slope.

The Ipson soil is in capability subclass VIe, nonirrigated, and the Trimad soil is in capability subclass VIIe, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

142—Manter sandy loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans, terraces, and knolls. It formed in loamy alluvium and eolian deposits derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Ascalon loam and Bayard fine sandy loam on alluvial fans and terraces. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Manter soil is dark brown sandy loam about 7 inches thick. The upper 12 inches of the subsoil is brown loam. The next layer of the subsoil is light yellowish brown fine sandy loam about 4 inches thick. The lower part of the subsoil to a depth of 60 inches or more is very pale brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife

habitat. Some areas are used as nonirrigated cropland.

This unit is moderately well suited to nonirrigated crops. The main limitations are low annual precipitation, droughtiness, and the hazard of wind erosion. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining crop residue on the surface after tillage.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable.

This unit is in capability subclass IIIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

143—Manter fine sandy loam, 6 to 30 percent slopes

This very deep, well drained soil is on terraces and hills. It formed in loamy alluvium and eolian deposits derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Wages loam on alluvial fans and terraces. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Manter soil is dark brown fine sandy loam about 7 inches thick. The upper 8 inches of the subsoil is yellowish brown fine sandy loam. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is poorly suited to stockwater ponds because of the potential for seepage and the slope. Areas of this soil that have slopes of less than 15 percent are moderately well suited to mechanical range renovation and range seeding. In these areas, the main limitations are the hazards of wind erosion and water erosion. Areas that have slopes of more than 15 percent are poorly suited to mechanical range

renovation and range seeding because of the slope and the hazard of water erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion. Tillage for range improvement is not recommended in areas that have slopes of more than 15 percent because of the hazard of water erosion. Interseeding and preparing the seedbed by band spraying of herbicides are suitable practices.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation, the slope, and droughtiness. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Tillage is not recommended in areas that have slopes of more than 15 percent, however, because of the hazard of water erosion. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable.

This unit is in capability subclass VIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

144—Manter-Treon fine sandy loams, 0 to 15 percent slopes

This map unit is on hills, terraces, and alluvial fans. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Manter fine sandy loam, 0 to 10 percent slopes, and 30 percent Treon fine sandy loam, 6 to 15 percent slopes. The Manter soil is on terraces and alluvial fans, and the Treon soil is on hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Aberone fine sandy loam on hills and terraces. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Manter soil is very deep and is well drained. It formed in loamy alluvium and eolian deposits derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The upper 12 inches of the subsoil is brown fine sandy loam. The next part of the subsoil is light yellowish brown fine sandy loam about 12 inches thick. The lower part of the subsoil to a depth of 60 inches or more is pale brown fine sandy loam.

Permeability is moderately rapid in the Manter soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The underlying material is pale brown fine sandy loam. It is about 10 inches thick. Semiconsolidated sandstone is at a depth of 18 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Manter soil is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Treon soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

These soils are poorly suited to stockwater ponds. The potential for seepage in the Manter soil and the depth to bedrock in the Treon soil are the main limitations. The Manter soil is moderately well suited to range seeding and mechanical range renovation. The hazard of wind erosion is the main limitation. The Treon soil is moderately suited to mechanical range renovation and range seeding. The main limitations are droughtiness and the hazards of wind erosion and water erosion. Mechanical renovation may not be economical on this unit because of low forage production in areas of the Treon soil and the coarse texture of the surface layer in both soils. Range seeding on the Treon soil may not be economically feasible because of the low forage production. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour can reduce the hazard of water erosion in areas that have slopes of more than 6 percent.

The Treon soil is poorly suited to windbreaks and environmental plantings because of the depth to bedrock and the droughtiness. The Manter soil is moderately suited. The droughtiness is the main limitation. The low annual precipitation should be considered when these plantings are planned. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable.

The Manter soil is in capability subclass IVe, nonirrigated. The Treon soil is in capability subclass VIIe, nonirrigated. The Manter soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Treon soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

145—Merden silty clay loam, 0 to 3 percent slopes

This very deep, poorly drained soil is on flood plains. It formed in silty alluvium derived from various sources. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of somewhat poorly drained soils in swales and draws. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Merden soil is very dark grayish brown, slightly saline silty clay loam about 12 inches thick. The subsoil is white, slightly saline silty clay loam about 12 inches thick. The substratum to a depth of 60 inches or more also is white, slightly saline silty clay loam. It has brown mottles.

Permeability is slow. The available water capacity is high. The effective rooting depth is 6 to 24 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to frequent long periods of flooding in April and May. Depth to the seasonal high water table is 6 to 24 inches from April through November.

This unit is used as hayland, rangeland, or wildlife habitat.

This unit is moderately suited to hay. The main limitations are wetness and salinity. The salinity limits the kinds of plants that can be grown. The careful planning of irrigation is needed to avoid raising the level of the water table. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The potential plant community is mainly alkali sacaton, western wheatgrass, fourwing saltbush, and inland saltgrass. The extent of inland saltgrass and greasewood increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annuals will invade. The potential plant community produces about 4,000 pounds of air-dry vegetation per acre in normal years. Production ranges from 4,500 pounds in favorable years to 3,000 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Deferring grazing until the soil surface is firm helps to prevent compaction and maintains productivity.

This unit is well suited to stockwater ponds. Pits dug to a depth below the level of the water table in the fall can provide water for livestock throughout the year.

This soil is moderately suited to mechanical range renovation and range seeding. The main limitations

are the wetness and the salinity. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. If range seeding is conducted, seeding rates may need to be increased and plant species carefully selected. The wetness limits the use of equipment during spring and early summer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the salinity and the wetness. Trees and shrubs that can tolerate these conditions should be planted. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVw, nonirrigated and irrigated. It is in the Saline Subirrigated, 15- to 17-inch precipitation zone, Southern Plains range site.

This soil is a hydric soil.

146—Merden, cool-Kovich complex, 0 to 3 percent slopes

This map unit is on flood plains. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 60 percent Merden silty clay loam, 0 to 3 percent slopes, and 35 percent Kovich loam, 0 to 3 percent slopes. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Breece fine sandy loam on alluvial fans and in draws. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Merden soil is very deep and is poorly drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is grayish brown silty clay loam about 10 inches thick. The subsoil is brown silty clay loam about 9 inches thick. The substratum to a depth of 60 inches or more is grayish brown silty clay loam that has many medium distinct yellowish brown mottles.

Permeability is slow in the Merden soil. The available water capacity is high. The effective rooting depth is 6 to 18 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to frequent long periods of flooding in April and May. Depth to the seasonal high water table is 6 to 18 inches from April through July. For the remainder of the year, the water table is at a depth of 20 to 40 inches.

The Kovich soil is very deep and is poorly drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsoil also is very dark grayish brown loam. It is about 20 inches thick. The substratum to a depth of 60 inches or more is dark brown gravelly sandy clay loam. The subsoil and substratum have dark yellowish brown mottles.

Permeability is moderate in the Kovich soil. The available water capacity is high. The effective rooting depth is 6 to 18 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to rare flooding. Depth to the seasonal high water table is 6 to 18 inches from April through July. During the remainder of the year, the water table is at a depth of 18 to 36 inches.

This unit is used as rangeland, hayland, or wildlife habitat.

This unit is moderately well suited to hay. The main limitation is wetness. The careful planning of irrigation is needed to avoid raising the level of the water table. Irrigation water should only be added if the soil moisture content in the root zone is less than 75 percent. Fertilizer is needed to ensure optimum growth of grasses and legumes. The fertilizer should be applied according to the results of soil tests. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff.

The potential plant community on the Merden soil is mainly big bluestem, indiangrass, little bluestem, willow, and prairie cordgrass. The extent of western wheatgrass, sedges, and willows increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, Kentucky bluegrass and annuals will invade. The potential plant community produces about 4,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 5,000 pounds in favorable years to 3,500 pounds in unfavorable years.

The potential plant community on the Kovich soil is mainly prairie cordgrass, sedges, bluejoint reedgrass, and rushes. The extent of blue grama and fringed

sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annuals will invade. The potential plant community produces about 5,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 6,000 pounds in favorable years to 4,000 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Deferring grazing until the soil surface is firm helps to prevent compaction and maintains productivity.

This unit is well suited to stockwater ponds. Pits dug to a depth below the level of the water table in the fall can provide water for livestock throughout the year.

This unit is moderately well suited to mechanical range renovation and range seeding. The main limitation is the wetness in the spring and summer, which restricts the use of equipment. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the wetness. Trees and shrubs that can tolerate wetness should be planted. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVw, nonirrigated and irrigated. The Merden soil is in the Subirrigated, 15- to 17-inch precipitation zone, Southern Plains range site, and the Kovich soil is in the Wetland, 15- to 17-inch precipitation zone, Southern Plains range site.

The soils in this map unit are hydric soils.

147—Mitchell silt loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans, hills, and terraces. It formed in silty alluvium derived from siltstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Nucla loam and Otero fine sandy loam on alluvial fans. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Mitchell soil is pale brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as nonirrigated cropland.

This unit is moderately well suited to nonirrigated crops. The low annual precipitation and the hazard of wind erosion are the main limitations. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The soil is well suited to mechanical range renovation and moderately well suited to range seeding. The main limitation affecting range seeding is the hazard of wind erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

148—Moskee fine sandy loam, 0 to 3 percent slopes

This very deep, well drained soil is on terraces, on alluvial fans, and in draws. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Manter fine sandy loam on alluvial fans and Taluce fine sandy loam on knolls. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Moskee soil is brown fine sandy loam about 7 inches thick. The upper 9 inches of the subsoil is brown sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown sandy loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

149—Nucla loam, 0 to 3 percent slopes

This very deep, well drained soil is on alluvial fans and terraces. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Wages loam and Ascalon loam on alluvial fans and terraces. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Nucla soil is dark

brown loam about 7 inches thick. The upper 9 inches of the subsoil is light yellowish brown loam. The next 12 inches of the subsoil is very pale brown loam. The lower part of the subsoil to a depth of 60 inches or more is very pale brown fine sandy loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is well suited to mechanical range renovation. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. The soil is moderately well suited to range seeding. The main limitation is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

150—Otero fine sandy loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans, hills, and knolls. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Paoli fine sandy loam and Vetal fine sandy loam on alluvial fans and in draws and Valent fine sand on hills. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Otero soil is yellowish brown fine sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as nonirrigated cropland.

This unit is moderately suited to nonirrigated crops. The main limitations are the low annual precipitation, droughtiness, and the hazard of wind erosion. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may

involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. The main limitation affecting range seeding is the hazard of wind erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and the droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

151—Otero-Valent-Tassel complex, 0 to 15 percent slopes

This map unit is on terraces, knolls, and dunes. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 35 percent Otero fine sandy loam, 0 to 15 percent slopes; 30 percent Valent loamy fine sand, 0 to 15 percent slopes; and 25 percent Tassel fine sandy loam, 3 to 15 percent slopes. The Otero soil is on terraces, hills, and knolls; the Tassel soil is on hills and knolls; and the Valent soil is on hills and dunes. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop and Bayard fine sandy loam on terraces. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Otero soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is yellowish brown fine sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown fine sandy loam.

Permeability is moderately rapid in the Otero soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow. The hazard of water erosion is slight, and the hazard of wind erosion is severe.

The Valent soil is very deep and is excessively drained. It formed in sandy eolian deposits derived from sandstone. Typically, the surface layer is dark yellowish brown loamy fine sand about 10 inches thick. The underlying material to a depth of 60 inches or more also is dark yellowish brown loamy fine sand.

Permeability is rapid in the Valent soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Tassel soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is brown fine sandy loam about 7 inches thick. The underlying material is pale brown fine sandy loam. It is about 5 inches thick. Semiconsolidated sandstone is at a depth of 12 inches.

Permeability is moderately rapid in the Tassel soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

The Valent and Otero soils are moderately well suited to irrigated hay. The main limitation is droughtiness. The Tassel soil is poorly suited to irrigated hay because of the droughtiness. Frequent applications of irrigation water are necessary because of the limited available water capacity. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. A sprinkler system is the most suitable method of irrigation on this unit. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community on the Otero soil is

mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Valent soil is mainly sand bluestem, prairie junegrass, needleandthread, and sand sagebrush. The extent of needleleaf sedge, green sagewort, and sand sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annuals will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 900 pounds in unfavorable years.

The potential plant community on the Tassel soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds because of the potential for seepage in the Otero and Valent soils and the depth to the bedrock in the Tassel soil.

The Valent soil is poorly suited to mechanical range renovation and range seeding. The main limitation affecting range seeding is the hazard of wind erosion. Tillage of the Valent soil for range improvement is not recommended. Interseeding and preparing the seedbed by band spraying of herbicides are suitable practices. The Otero soil is only moderately well suited to range seeding and mechanical range renovation because of the hazard of wind erosion.

Mechanical range renovation on all of the soils and range seeding on the Tassel soil may not be economically feasible because of the coarse texture of the surface layer and low forage production.

If range seeding is conducted on this unit, leaving an adequate cover of residue on the surface after planting can reduce the hazard of wind erosion.

The Otero and Valent soils are moderately suited to windbreaks and environmental plantings. Droughtiness is the main limitation. The Treon soil is poorly suited because of the depth to bedrock and the droughtiness. The low annual precipitation should be considered when these plantings are planned on any of these soils. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Otero soil is in capability subclass IVe, nonirrigated and irrigated. The Valent soil is in capability subclass VIe, nonirrigated, and IVe, irrigated. The Tassel soil is in capability subclass VIIe, nonirrigated and irrigated. The Otero soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site; the Valent soil is in the Sands, 15- to 17-inch precipitation zone, Southern Plains range site; and the Tassel soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

152—Paoli fine sandy loam, 0 to 3 percent slopes

This very deep, well drained soil is on alluvial fans and terraces and in draws. It formed in loamy alluvium derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Vetal fine sandy loam on alluvial fans and in draws and Bayard fine sandy loam on alluvial fans and terraces. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the upper part of the surface layer of the Paoli soil is dark brown fine sandy loam about 18 inches thick. The lower part is brown fine sandy loam

about 5 inches thick. The subsoil to a depth of 60 inches or more also is brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as nonirrigated cropland.

This unit is moderately well suited to nonirrigated crops. The main limitations are the low annual precipitation, droughtiness, and the hazard of wind erosion. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitation affecting range seeding is the hazard of wind erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and the droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

153—Paoli fine sandy loam, 6 to 9 percent slopes

This very deep, well drained soil is on dissected alluvial fans. It formed in loamy alluvium derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of soils that are noncalcareous throughout and areas of soils that have a surface layer of loamy sand. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Paoli soil is brown fine sandy loam about 13 inches thick. The upper 8 inches of the subsoil is brown sandy loam. The lower part to a depth of 60 inches or more is pale brown sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, thickspike wheatgrass, and prairie sandreed. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both.

Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. The main limitations affecting range seeding are the hazards of wind erosion and water erosion. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

154—Peetz gravelly sandy loam, 5 to 20 percent slopes

This very deep, somewhat excessively drained soil is on ridges, breaks, backslopes, and shoulders. It formed in gravelly alluvium derived from sandstone and conglomerate. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Altvan sandy loam and rock outcrop on ridgetops and breaks and Ascalon fine sandy loam and Wages fine sandy loam on footslopes of ridges and breaks. These areas make up about 20 percent of the total acreage. The percentage varies from one delineation to another.

Typically, 15 to 35 percent of the surface of the Peetz soil is covered with gravel and cobbles. The upper part of the surface layer is grayish brown gravelly sandy loam about 4 inches thick. The lower part is brown very gravelly loamy sand about 4 inches thick. The subsoil is pale brown very gravelly sand about 12 inches thick. The substratum to a depth of 60 inches or more is very pale brown very gravelly sand.

Permeability is rapid. The available water capacity is very low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, sideoats grama, blue grama, and prairie sandreed. The extent of blue grama and fringed sage increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is poorly suited to stockwater ponds, mechanical range renovation, and range seeding. The main limitations affecting stockwater ponds are the potential for seepage and the slope. The main limitations affecting range seeding and mechanical range renovation are the hazard of erosion, the gravelly surface layer, and droughtiness. Mechanical range renovation may not be economically feasible because of the coarse texture of the surface layer. Range seeding by tillage methods is not practical because of the gravel in the surface layer.

This unit is poorly suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation, the gravel in the upper layers, and the droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs may not survive unless irrigation is provided. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture.

This unit is in capability subclass VIe, nonirrigated. It is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

155—Peetz-Altvan complex, 0 to 20 percent slopes

This map unit is on ridges, breaks, and terraces. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 40 percent Peetz gravelly sandy loam, 6 to 20 percent slopes, and 35 percent Altvan fine sandy loam, 0 to 10 percent slopes. The Peetz soil is on shoulders of ridges and breaks. The Altvan soil is on ridgetops and terraces. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Otero sandy loam and Paoli fine sandy loam. These areas make up about 25 percent of the total acreage. The percentage varies from one delineation to another.

The Peetz soil is very deep and is somewhat excessively drained. It formed in gravelly alluvium derived from various sources. Typically, 15 to 35 percent of the surface is covered with gravel, cobbles, and small stones. The upper part of the surface layer is grayish brown gravelly sandy loam about 4 inches thick. The lower part of the surface layer is brown very gravelly sandy loam about 4 inches thick. The subsoil is pale brown very gravelly sand about 12 inches thick. The substratum to a depth of 60 inches or more is very pale brown very gravelly sand.

Permeability is rapid in the Peetz soil. The available water capacity is very low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Altvan soil is very deep and is well drained. It formed in loamy alluvium over sandy alluvium derived from various sources. Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The upper part of the subsoil is brown sandy clay loam and clay loam about 16 inches thick. The lower part to a depth of 60 inches or more is yellowish brown gravelly coarse sand.

Permeability is moderate in the upper part of the subsoil in the Altvan soil and very rapid in the lower part. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Peetz soil is mainly needleandthread, little bluestem, sideoats grama, blue grama, and prairie sandreed. The extent of blue grama, threadleaf sedge, and fringed sage increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Altvan soil is mainly blue grama, needleandthread, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is poorly suited to stockwater ponds because of the potential for seepage. The Peetz soil is poorly suited to mechanical range renovation and range seeding. The main limitations are the gravelly surface layer, droughtiness, and the hazard of erosion. Mechanical range renovation on the Peetz soil may not be economically feasible or practical because of the gravelly and coarse textured surface layer. Range seeding by tillage methods is not practical because of the gravel in the surface layer.

The Altvan soil is moderately well suited to mechanical range renovation and range seeding. The main limitation is the hazard of water erosion in areas that have slopes of more than 6 percent. Mechanical range renovation may be used in areas of the Altvan soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion in areas that have slopes of more than 6 percent.

The Peetz soil is poorly suited to windbreaks and environmental plantings. The main limitations are the droughtiness and the gravel in the upper layers. The Altvan soil is moderately suited to windbreaks and environmental plantings. The main limitation is the droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. Windbreaks should be planted at

a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. They may not survive on the Peetz soil unless irrigation is provided. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. Wind erosion can be reduced by using stubble mulch tillage. Tillage in areas of the Peetz soil is not practical, however, because of the gravel in the surface layer. In addition, tillage in areas that have slopes of more than 15 percent is not recommended because of the hazard of water erosion.

The Peetz soil is in capability subclass VIe, nonirrigated. The Altvan soil is in capability subclass IVe, nonirrigated. The Peetz soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site. The Altvan soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

156—Pinelli loam, 3 to 10 percent slopes

This very deep, well drained soil is on hillslopes, on alluvial fans, and in draws. It formed in clayey alluvium derived from various sources. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Chivington loam on alluvial fans and in draws. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Pinelli soil is dark brown loam about 3 inches thick. The upper 4 inches of the subsoil is brown clay loam. The next 23 inches of the subsoil is brown clay. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown sandy clay loam.

Permeability is slow. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

This unit is moderately well suited to irrigated hay. The main limitation is the slope. Because of the slope, sprinkler irrigation is the best method. Contour ditch irrigation can be used if the system is properly designed. The water should be uniformly distributed, and overirrigation should be avoided. Adjusting the applications of irrigation water according to the available water capacity and the needs of the crop can help to prevent the leaching of plant nutrients.

The potential plant community is mainly western wheatgrass, green needlegrass, and winterfat. The extent of blue grama and buffalograss increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This unit is moderately well suited to stockwater ponds, range seeding, and mechanical range renovation. The main limitation affecting stockwater ponds is the slope. The main limitation affecting range seeding and mechanical range renovation is the hazard of water erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be along the contour.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from erosion by using stubble mulch tillage along the contour. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

This unit is in capability subclass IVe, nonirrigated and irrigated. It is in the Clayey, 15- to 17-inch precipitation zone, Southern Plains range site.

157—Pinelli-Chivington complex, 0 to 15 percent slopes

This map unit is on terraces, alluvial fans, and hillslopes and in draws. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 70 percent Pinelli clay loam, 3 to 15 percent slopes, and 20 percent Chivington loam, 0 to 6 percent slopes. The Pinelli soil is on alluvial fans, in draws, and on hillslopes, and the Chivington soil is on alluvial fans and terraces and in draws. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Evanston loam on terraces, alluvial fans, and hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Pinelli soil is very deep and is well drained. It formed in clayey alluvium derived from various sources. Typically, the surface layer is dark brown clay loam about 4 inches thick. The upper 19 inches of the subsoil is brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is light brown sandy clay loam.

Permeability is slow in the Pinelli soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Chivington soil is very deep and is well drained. It formed in clayey alluvium derived from various sources. Typically, the surface layer is dark brown loam about 10 inches thick. The upper 13 inches of the subsoil is dark brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown gravelly clay loam.

Permeability is slow in the Chivington soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, green needlegrass, and winterfat. The extent of blue grama and buffalograss increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,700 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

The Pinelli soil is moderately well suited to stockwater ponds, range seeding, and mechanical range renovation. The main limitation affecting stockwater ponds is the slope. The main limitation affecting range seeding and mechanical range renovation is the hazard of water erosion. The Chivington soil is well suited to stockwater ponds, mechanical range renovation, and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be along the contour.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from erosion by using stubble mulch tillage along the contour. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

This unit is in capability subclass IVe, nonirrigated. It is in the Clayey, 15- to 17-inch precipitation zone, Southern Plains range site.

158—Poposhia silt loam, 0 to 6 percent slopes

This very deep, well drained soil is on valley floors, alluvial fans, and knolls. It formed in silty alluvium and residuum derived from siltstone. The native vegetation is mainly grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Piezon silt loam and Blazon silt loam on hills. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Poposhia soil is brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annuals will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

This soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The soil is well suited to range seeding and mechanical range renovation. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

159—Poposhia-Blazon silt loams, 3 to 30 percent slopes

This map unit is on hills and adjacent alluvial fans and in draws. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 70 percent Poposhia silt loam, 3 to 15 percent slopes, and 20 percent Blazon silt loam, 6 to 30 percent slopes. The Poposhia soil is in draws and on alluvial fans and hills, and the Blazon soil is on hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of siltstone bedrock on side slopes of hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is yellowish brown silt loam about 10 inches thick. The underlying material to a depth of 60 inches or more also is yellowish brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Blazon soil is shallow and well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The underlying material is yellowish brown silt loam. It is about 7 inches thick. Semiconsolidated siltstone is at a depth of 13 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Poposhia soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per

acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Poposhia soil is moderately well suited to stockwater ponds, range seeding, and mechanical range renovation. The main limitations affecting stockwater ponds are the moderate potential for seepage and the slope. The main limitation affecting range seeding and mechanical range renovation is the hazard of water erosion. The Blazon soil is poorly suited to range seeding and mechanical range renovation because of the slope. It is poorly suited to stockwater ponds because of the depth to bedrock and the slope.

Mechanical range renovation and range seeding on the Blazon soil may not be economically feasible because of low forage production. In addition, tillage for range improvement is not recommended on the Blazon soil. Other methods of seeding could be used if range improvement cannot be accomplished by grazing-control measures. Mechanical range renovation may be used in areas of the Poposhia soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

The Poposhia soil is moderately well suited to windbreaks and environmental plantings. Because of the slope and droughtiness, the Blazon soil should not be used as a site for these plantings. The low annual precipitation should be considered when these plantings are planned on either of these soils. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion and water erosion by using stubble mulch tillage. Tillage in areas that have slopes of more than 15 percent, however, is not recommended because of the hazard of water erosion.

The Poposhia soil is in capability subclass IVe, nonirrigated. The Blazon soil is in capability subclass VIIe, nonirrigated. The Poposhia soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

160—Poposhia-Blazon, thin solum-Rock outcrop complex, 5 to 35 percent slopes

This map unit is on hills and ridges, in adjacent draws, and on alluvial fans. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Poposhia silt loam, 5 to 15 percent slopes; 35 percent Blazon silt loam, 15 to 35 percent slopes; and 20 percent siltstone Rock outcrop. The Poposhia soil is in draws and on alluvial fans, and the Blazon soil and the Rock outcrop are on hills and ridges. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of moderately deep, loamy soils on the lower part of the hillslopes. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium and residuum derived from various sources. Typically, the surface layer is yellowish brown silt loam about 4 inches thick. The underlying material to a depth of 60 inches or more also is yellowish brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Blazon soil is very shallow and is well drained. It formed in silty residuum and alluvium derived from

siltstone. Typically, the surface layer is yellowish brown silt loam about 3 inches thick. The underlying material is light yellowish brown silt loam. It is about 6 inches thick. Semiconsolidated shale is at a depth of 9 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop consists of exposed areas of siltstone bedrock on escarpments.

This unit is used as rangeland or wildlife habitat.

The potential plant community on the Poposhia soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Poposhia soil is moderately well suited to stockwater ponds, range seeding, and mechanical range renovation. The main limitations affecting stockwater ponds are the moderate potential for seepage and the slope. The main limitation affecting range seeding and mechanical range renovation is the hazard of water erosion. The Blazon soil is poorly suited to range seeding and mechanical range renovation because of the slope. It is poorly suited to stockwater ponds because of the depth to bedrock and the slope.

Mechanical range renovation and range seeding on the Blazon soil may not be economically feasible because of low forage production. In addition, tillage for range improvement is not recommended on the Blazon soil because of the hazard of water erosion. Other methods of seeding could be used if range improvement cannot be accomplished by grazing-control measures. Mechanical range renovation may be used in areas of the Poposhia soil where desirable vegetation has been replaced by sod-forming plants. If the Poposhia soil is seeded, leaving an adequate cover of residue on the surface after planting and tilling along the contour can reduce the hazard of water erosion.

The Poposhia soil is moderately well suited to windbreaks and environmental plantings. Because of the slope and droughtiness, the Blazon soil should not be used as a site for these plantings. The low annual precipitation should be considered when these plantings are planned on either of these soils. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion and water erosion by using stubble mulch tillage. Tillage in areas that have slopes of more than 15 percent, however, is not recommended because of the hazard of water erosion.

The Poposhia soil is in capability subclass IVe, nonirrigated; the Blazon soil is in capability subclass VIIe, nonirrigated; and the Rock outcrop is in capability subclass VIIIs. The Poposhia soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Blazon soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site.

161—Poposhia-Piezon silt loams, 0 to 6 percent slopes

This map unit is on alluvial fans, in draws, and on adjacent hills and knolls. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 60 percent Poposhia silt loam, 0 to 6 percent slopes, and 30 percent Piezon silt loam, 3 to 6 percent slopes. The Poposhia soil is in draws and on alluvial fans and knolls, and the Piezon soil is on hills and knolls. The two soils occur as areas so intricately

intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Blazon silt loam on hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil is very pale brown silt loam about 12 inches thick. The lower part of the subsoil to a depth of 60 inches or more also is very pale brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Piezon soil is moderately deep and is well drained. It formed in silty residuum and colluvium derived from siltstone. Typically, the surface layer is brown silt loam about 4 inches thick. The upper 9 inches of the subsoil is light yellowish brown silt loam. The lower part of the subsoil also is light yellowish brown silt loam. It is about 10 inches thick. Semiconsolidated siltstone is at a depth of 23 inches.

Permeability is moderate in the Piezon soil. The available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

The Poposhia soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The Piezon soil is poorly suited to stockwater ponds because of the depth to bedrock.

This unit is well suited to mechanical range renovation and range seeding. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

The Poposhia soil is moderately well suited to windbreaks and environmental plantings. The Piezon soil is moderately suited. The main limitation is droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

162—Poposhia-Trimad complex, 3 to 15 percent slopes

This map unit is on hills, on alluvial fans, and in draws. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Poposhia silt loam, 3 to 6 percent slopes, and 40 percent Trimad loam, 6 to 15 percent slopes. The Poposhia soil is on alluvial fans and hills and in draws, and the Trimad soil is on hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Piezon silt loam on hills and valley floors and rock outcrop on side slopes of hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is brown silt loam about 7 inches thick. The upper 18 inches of the

underlying material is yellowish brown silt loam. The lower part of the underlying material to a depth of 60 inches or more is pale brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the upper part of the surface layer is dark brown loam about 3 inches thick. The lower 7 inches is brown gravelly loam. The upper 24 inches of the subsoil is very pale brown very gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is very pale brown very gravelly sandy loam.

Permeability is moderate in the Trimad soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as nonirrigated cropland.

The Poposhia soil is moderately well suited to nonirrigated crops. The main limitation is the low annual precipitation. The Trimad soil is poorly suited to nonirrigated cultivated crops because of droughtiness and the low annual precipitation. The Trimad soil is not capable of producing economical yields or sufficient crop growth to protect the soil from erosion. In many areas where these soils are especially intermingled, the soils are poorly suited to nonirrigated crops. A permanent vegetative cover is recommended in these areas. In areas where a large acreage of the Poposhia soil is available for cropping, tilling along the contour can reduce the hazard of water erosion. Maintaining a cover of crop residue on or near the surface reduces the runoff rate and helps to control water erosion and wind erosion.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Poposhia soil is moderately well suited to stockwater ponds. The main limitation is the moderate potential for seepage. The Trimad soil is poorly suited to stockwater ponds because of the potential for seepage. The Poposhia soil is moderately well suited to range seeding and mechanical range renovation. The main limitation is the hazard of water erosion. The Trimad is moderately suited to range seeding and mechanical range renovation. The main limitations are the gravel in the upper part of the profile and the hazard of water erosion.

Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be on the contour.

The Poposhia soil is moderately well suited to windbreaks and environmental plantings. The Trimad soil is only moderately suited because of droughtiness and the gravel in the upper layers. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Poposhia soil is in capability subclass IVe, nonirrigated. The Trimad soil is in capability subclass VIs, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

163—Redthayne-Tyzak, thin solum-Evanston complex, 0 to 15 percent slopes

This map unit is on hills, hogbacks, adjacent alluvial fans, and terraces. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual

precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 35 percent Redthayne channery loam, 3 to 10 percent slopes; 30 percent Tyzak channery loam, 10 to 15 percent slopes; and 25 percent Evanston loam, 0 to 6 percent slopes. The Redthayne and Tyzak soils are on side slopes of hills and hogbacks, and the Evanston soil is on hills, terraces, and alluvial fans. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Tieside loam on side slopes of hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Redthayne soil is very deep and is well drained. It formed in very channery loamy colluvium derived from various sources. Typically, the surface layer is dark brown channery loam about 8 inches thick. The upper part of the subsoil is brown very channery loam about 6 inches thick. The lower part of the subsoil to a depth of 60 inches or more also is brown very channery loam.

Permeability is moderate in the Redthayne soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of wind erosion also is slight.

The Tyzak soil is very shallow and is well drained. It formed in very channery loamy residuum and colluvium derived from limestone and interbedded sandstone. Typically, the surface layer is dark brown channery loam about 4 inches thick. The subsoil is dark brown very channery loam about 4 inches thick. Consolidated limestone is at a depth of 8 inches.

Permeability is moderate in the Tyzak soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 3 inches thick. The upper part of the subsoil is brown sandy clay loam about 6 inches thick. The next part of the subsoil, to a depth of about 26 inches, is yellowish brown loam. The lower part of the subsoil to a depth of 60 inches or more is very pale brown loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Redthayne and Tyzak soils is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

The potential plant community on the Evanston soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

The Redthayne and Tyzak soils are poorly suited to stockwater ponds. The main limitations are the potential for seepage in the Redthayne soil and the depth to bedrock in the Tyzak soil. The Evanston soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation.

The Redthayne and Tyzak soils are poorly suited to range seeding and mechanical range renovation because of the rock fragments in the surface layer. In addition, mechanical range renovation on the Redthayne and Tyzak soils may not be economically feasible because of low forage production.

The Evanston soil is well suited to range seeding and mechanical range renovation. Mechanical range renovation may be used in areas of the Evanston soil where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

The Redthayne soil is only moderately suited to windbreaks and environmental plantings because of droughtiness and the rock fragments in the upper layers. The Tyzak soil is poorly suited because of the depth to bedrock. This soil should not be used as a site for these plantings. The Evanston soil is moderately well suited to windbreaks and environmental plantings. The low annual precipitation should be considered when these plantings are planned on any of these soils. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. Cultivation in areas of the Redthayne and Tyzak soils is difficult because of the rock fragments in the soil.

The Redthayne soil is in capability subclass VIs, nonirrigated. The Tyzak soil is in capability subclass VIIe, nonirrigated. The Evanston soil is in capability subclass IVe, nonirrigated. The Redthayne and Tyzak soils are in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site, and the Evanston soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

164—Redthayne-Tyzak-Rock outcrop complex, 15 to 45 percent slopes

This map unit is on side slopes of hills, ridges, and hogbacks. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Redthayne channery loam, 15 to 30 percent slopes; 30 percent Tyzak channery loam, 15 to 45 percent slopes; and 20 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Tieside loam on side slopes of hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Redthayne soil is very deep and is well drained. It formed in very channery loamy colluvium derived from various sources. Typically, the surface layer is brown channery loam about 8 inches thick. The upper part of the subsoil is brown very channery loam about 6 inches thick. The lower part of the subsoil to a depth of 60 inches or more also is brown very channery loam.

Permeability is moderate in the Redthayne soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Tyzak soil is shallow and well drained. It formed in very channery loamy residuum derived from limestone interbedded with sandstone. Typically, the surface layer is dark brown channery loam about 7 inches thick. The subsoil is yellowish brown very channery loam about 8 inches thick. Consolidated limestone is at a depth of 15 inches.

Permeability is moderate in the Tyzak soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop consists of exposed areas of interbedded limestone and sandstone bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Redthayne and Tyzak soils is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to stockwater ponds, mechanical range renovation, and range seeding mainly because of the slope.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Redthayne soil is in capability subclass VIe, nonirrigated, and the Tyzak soil is in capability subclass VIIe, nonirrigated. The Rock outcrop is in

capability subclass VIIIs. The Redthayne and Tyzak soils are in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site.

165—Riverwash

This unit is on flood plains. It consists of areas of sand, gravel, and/or cobbles in meanders and oxbows. The unit is subject to frequent flooding. Areas of Riverwash have a high water table. Depth to the water table and the period and length of time it is close to the surface depend on the nature of the associated stream.

This unit is a probable source of sand or gravel for construction material. The unit is poorly suited to building site development because of the frequent flooding.

This unit is in capability subclass VIIIw, nonirrigated.

166—Rock outcrop-Blazon, thin solum, complex, 30 to 60 percent slopes

This map unit is on hills and ridges. The native vegetation consists mainly of shrubs and grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 50 percent Rock outcrop and 40 percent Blazon gravelly silt loam, 30 to 60 percent slopes. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Poposhia silt loam on alluvial fans and knolls. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Rock outcrop consists of exposed areas of siltstone and soft shale bedrock.

The Blazon soil is very shallow and is well drained. It formed in silty alluvium and residuum derived from siltstone and shale. Typically, the surface layer is brown gravelly silt loam about 3 inches thick. The underlying material is pale brown gravelly silt loam about 6 inches thick. Semiconsolidated siltstone is at a depth of 9 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Blazon soil is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds mainly because of the slope.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Blazon soil is in capability subclass VIIe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Blazon soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site.

167—Rock outcrop-Cathedral complex, 20 to 40 percent slopes

This map unit is on mountain ridges and foothills. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 55 percent Rock outcrop and 30 percent Cathedral gravelly loam. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Boyle gravelly loam on hills and side slopes of ridges. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Rock outcrop consists of exposed areas of granite, gneiss, and schist bedrock.

The Cathedral soil is shallow and well drained. It

formed in very gravelly loamy residuum and colluvium derived from granite, gneiss, and schist. The surface layer is dark brown gravelly loam about 7 inches thick. The underlying material is yellowish brown extremely gravelly sandy loam about 6 inches thick. Consolidated granite is at a depth of 13 inches.

Permeability is moderately rapid in the Cathedral soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Cathedral soil is mainly bluebunch wheatgrass, slimstem muhly, and threetip sagebrush. The extent of threadleaf sedge and bluegrasses increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,200 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds mainly because of the slope.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Cathedral soil is in capability subclass VIIe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Cathedral soil is in the Shallow Igneous, 15- to 19-inch precipitation zone, Foothills and Mountains Southeast range site.

168—Taluce-Taluce, thin solum-Rock outcrop complex, 3 to 30 percent slopes

This map unit is on hills and ridges. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 40 percent Taluce fine sandy loam, 3 to 30 percent slopes; 30 percent Taluce fine sandy loam, thin solum, 6 to 15 percent slopes; and 20 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Otero fine sandy loam on alluvial fans. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Taluce soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The underlying material also is brown fine sandy loam. It is about 11 inches thick. Semiconsolidated sandstone is at a depth of 17 inches.

Permeability is moderately rapid in the Taluce soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Taluce, thin solum, soil is very shallow and is well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is yellowish brown fine sandy loam about 6 inches thick. Semiconsolidated sandstone is at a depth of 6 inches.

Permeability is moderately rapid in the Taluce, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Rock outcrop consists of exposed areas of sandstone bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Taluce soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Taluce, thin solum, soil is mainly bluebunch wheatgrass, little bluestem, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant

community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds mainly because of the slope and the depth to bedrock.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Taluce soils are in capability subclass VIIe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Taluce soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Taluce, thin solum, soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site.

169—Taluce-Taluce, thin solum-Turnercrest fine sandy loams, 3 to 15 percent slopes

This map unit is on hills and ridges and adjacent alluvial fans. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 40 percent Taluce fine sandy loam, 3 to 15 percent slopes; 30 percent Taluce fine sandy loam, thin solum, 6 to 15 percent slopes; and 20 percent Turnercrest fine sandy loam, 3 to 15 percent slopes. The Taluce soils are on hills and ridges, and the Turnercrest soil is on hills and alluvial fans. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Embry loamy fine sand on alluvial fans and terraces and Valent loamy fine sand on hills and dunes. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Taluce soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is yellowish brown fine sandy loam about 6 inches thick. The underlying material also is yellowish brown fine sandy loam. It is about 11 inches thick. Semiconsolidated sandstone is at a depth of 17 inches.

Permeability is moderately rapid in the Taluce soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Taluce, thin solum, soil is very shallow and is well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The underlying material is yellowish brown fine sandy loam. It is about 4 inches thick. Semiconsolidated sandstone is at a depth of 7 inches.

Permeability is moderately rapid in the Taluce, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Turnercrest soil is moderately deep and is well drained. It formed in loamy residuum and eolian deposits derived from sandstone. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The underlying material also is brown fine sandy loam. It is about 22 inches thick. Semiconsolidated sandstone is at a depth of 28 inches.

Permeability is moderately rapid in the Turnercrest soil. The available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Taluce soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Taluce, thin solum, soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom

snakeweed and curlycup gumweed will invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Turnercrest soil is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This unit is poorly suited to stockwater ponds because of the depth to bedrock and the potential for seepage. The Taluce soils are poorly suited to range seeding and mechanical range renovation because of droughtiness. The Turnercrest soil is moderately well suited to range seeding and mechanical range renovation. The hazards of wind erosion and water erosion are the main limitations. Mechanical range renovation may not be economically feasible on this unit because of the low forage production on the Taluce soils and the coarse texture of the surface layer in all three soils.

Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

The Taluce soils are poorly suited to windbreaks and environmental plantings because of the depth to bedrock and the droughtiness. These soils should not be used as a site for these plantings. The Turnercrest soil is only moderately suited because of the droughtiness. The low annual precipitation should be considered when these plantings are planned on any of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour as close to a right angle to the prevailing winds as possible.

The Taluce soils are in capability subclass VIIe, nonirrigated, and the Turnercrest soil is in capability subclass IVe, nonirrigated. The Taluce soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site; the Taluce, thin solum, soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site; and the Turnercrest soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

170—Tieside, north slopes-Rock outcrop complex, 10 to 45 percent slopes

This map unit is on hills and ridges. The native vegetation is mainly grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 70 percent Tieside loam, 10 to 45 percent slopes, and 20 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Tyzak channery loam and Redthayne channery loam on side slopes of hills and ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Tieside soil is shallow and well drained. It formed in loamy colluvium and residuum derived from red sandstone. Typically, the surface layer is dark red loam about 4 inches thick. The subsoil also is dark red loam. It is about 8 inches thick. Semiconsolidated sandstone is at a depth of 12 inches.

Permeability is moderate in the Tieside soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop consists of exposed areas of red sandstone bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Tieside soil is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in

normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds mainly because of the slope.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Tieside soil is in capability subclass VIIe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Tieside soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site.

171—Treon-Aberone fine sandy loams, 6 to 30 percent slopes

This map unit is on hills, in adjacent draws, and on terraces. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Treon fine sandy loam, 15 to 30 percent slopes, and 30 percent Aberone fine sandy loam, 6 to 15 percent slopes. The Treon soil is on hills, and the Aberone soil is on terraces and hills and in draws. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Vetal fine sandy loam on alluvial fans and in draws. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, 15 to 20 percent of the surface is covered with gravel. The surface layer is dark brown fine sandy loam about 8 inches thick. The underlying material is yellowish brown fine sandy loam about 8 inches thick. Semiconsolidated sandstone is at a depth of 16 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Aberone soil is very deep and is well drained. It formed in loamy alluvium and colluvium derived from various sources. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The upper part of the subsoil is yellowish brown fine sandy loam about 9 inches thick. The lower part of the subsoil to a depth of 60 inches or more is light gray very gravelly sandy loam.

Permeability is moderately rapid in the Aberone soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat. A few areas are used as hayland.

The potential plant community on the Treon soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Aberone soil is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds. The main limitations are the potential for seepage in the Aberone soil and the depth to bedrock and the slope in areas of the Treon soil. The Treon soil is poorly suited

to mechanical range renovation and range seeding. The main limitations are the slope, the hazard of erosion, and droughtiness. The Aberone soil is moderately well suited to mechanical range renovation and range seeding. The main limitations are the hazards of wind erosion and water erosion. Mechanical range renovation is used where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be along the contour. The use of tillage for range improvement in areas that have slopes of more than 15 percent is not recommended because of the hazard of water erosion.

The Treon soil is poorly suited to hay because of the slope and the droughtiness. The Aberone soil is moderately well suited. The main limitations are the slope and the droughtiness. In many areas where the soils are closely intermingled, this unit is poorly suited to nonirrigated hay. Irrigated hay should be grown only in areas of the Aberone soil. Frequent applications of irrigation water are necessary because of the limited available water capacity. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients.

The Treon soil is poorly suited to windbreaks and environmental plantings because of the slope, the droughtiness, and the depth to bedrock. This soil should not be used as a site for these plantings. The Aberone soil is only moderately suited because of the droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture.

The Treon soil is in capability subclass VIIe, nonirrigated and irrigated. The Aberone soil is in capability subclass VIs, nonirrigated and irrigated. The Treon soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Aberone soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

172—Treon-Aberone-Treon, thin solum, fine sandy loams, 3 to 30 percent slopes

This map unit is on hills, in adjacent draws, and on terraces (fig. 3). The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is 15 to 17 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 35 percent Treon fine sandy loam, 3 to 30 percent slopes; 30 percent Aberone fine sandy loam, 3 to 15 percent slopes; and 20 percent Treon fine sandy loam, thin solum, 3 to 30 percent slopes. The Treon soils are on hills, and the Aberone soil is on terraces and hills and in draws. The three soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Bayard fine sandy loam on alluvial fans and in draws and rock outcrop on hills and ridges. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, 15 to 20 percent of the surface is covered with gravel. The surface layer is dark brown fine sandy loam about 8 inches thick. The underlying material is yellowish brown fine sandy loam about 8 inches thick. Semiconsolidated sandstone is at a depth of 16 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Aberone soil is very deep and is well drained. It formed in loamy alluvium and colluvium derived from various sources. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The upper part of the subsoil is yellowish brown fine sandy loam about 9 inches thick. The lower part of the subsoil to a depth of 60 inches or more is light gray very gravelly sandy loam.

Permeability is moderately rapid in the Aberone soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Treon, thin solum, soil is very shallow and is

Figure 3.—A typical landscape in an area of Treon-Aberone-Treon, thin solum, fine sandy loams, 3 to 30 percent slopes. The Treon soils are on the upper part of the hillslopes, and the Aberone soil is on the lower part of the hillslopes and in the draws.

well drained. It formed in loamy residuum derived from sandstone. Typically, 15 to 20 percent of the surface is covered with gravel. The surface layer is dark brown fine sandy loam about 4 inches thick. The underlying material is brown fine sandy loam about 3 inches thick. Semiconsolidated sandstone is at a depth of 7 inches.

Permeability is moderately rapid in the Treon, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Treon soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Aberone soil is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

The potential plant community on the Treon, thin solum, soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian

ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds. The main limitations are the potential for seepage in the Aberone soil and the depth to bedrock and the slope in areas of the Treon soils. The Treon soils are poorly suited to mechanical range renovation and range seeding. The main limitations are the slope, the hazard of erosion, and droughtiness. The Aberone soil is moderately well suited to mechanical range renovation and range seeding. The main limitations are the hazards of wind erosion and water erosion. Mechanical range renovation is used where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tillage for range improvement should be along the contour. In areas that have slopes of more than 15 percent, however, tillage is not recommended because of the hazard of water erosion.

The Treon soils are poorly suited to windbreaks and environmental plantings because of the slope, the droughtiness, and the depth to bedrock. These soils should not be used as a site for these plantings. The Aberone soil is only moderately suited because of the droughtiness. The low annual precipitation should be considered when these plantings are planned on any of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture.

The Treon soils are in capability subclass VIIe, nonirrigated. The Aberone soil is in capability subclass VIs, nonirrigated. The Treon soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site; the Aberone soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site; and the Treon, thin solum, soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site.

173—Treon, dry-Aberone fine sandy loams, 10 to 30 percent slopes

This map unit is on hills, in adjacent draws, and on terraces. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Treon fine sandy loam, 15 to 30 percent slopes, and 30 percent Aberone fine sandy loam, 10 to 20 percent slopes. The Treon soil is on hills, and the Aberone soil is on terraces and hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop along hill escarpments and Paoli fine sandy loam in draws and on terraces. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, 15 to 20 percent of the surface is covered with gravel. The surface layer is brown fine sandy loam about 7 inches thick. The underlying material is pale brown fine sandy loam. It is about 6 inches thick. Semiconsolidated sandstone is at a depth of 13 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Aberone soil is very deep and is well drained. It formed in loamy alluvium and colluvium derived from various sources. Typically, the surface layer is dark brown fine sandy loam about 4 inches thick. The upper 10 inches of the subsoil is brown sandy loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability is moderately rapid in the Aberone soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds, mechanical range renovation, and range seeding mainly because of the slope. The potential for seepage in the Aberone soil and the depth to bedrock in the Treon soil also limit pond development.

The Treon soil is poorly suited to windbreaks and environmental plantings because of the slope, droughtiness, and the depth to bedrock. This soil should not be used as a site for these plantings. The Aberone soil is only moderately suited because of the droughtiness and the slope. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture.

The Treon soil is in capability subclass VIIe, nonirrigated. The Aberone soil is in capability subclass VIs, nonirrigated. This unit is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site.

174—Treon, thin solum-Rock outcrop-Treon complex, 6 to 30 percent slopes

This map unit is on hills and ridges. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 40 percent Treon fine sandy loam, thin solum, 6 to 30 percent slopes; 30 percent Rock outcrop; and 20 percent Treon fine sandy loam, 6 to 30 percent slopes. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Aberone fine sandy loam on terraces and ridges and Otero fine sandy loam on alluvial fans and hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Treon, thin solum, soil is very shallow and is well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 6 inches thick. Semiconsolidated sandstone is at a depth of 6 inches.

Permeability is moderately rapid in the Treon, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Rock outcrop consists of exposed areas of sandstone bedrock.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The underlying material is pale brown fine sandy loam about 8 inches thick. Semiconsolidated sandstone is at a depth of 16 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Treon, thin solum, soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Treon soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases

when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope and the depth to bedrock.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Treon soils are in capability subclass VIIe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Treon, thin solum, soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site, and the Treon soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

175—Treon, dry-Bayard association, 3 to 30 percent slopes

This map unit is on hills and ridges and adjacent alluvial fans and in draws. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 55 percent Treon fine sandy loam, 6 to 30 percent slopes, and 30 percent Bayard fine sandy loam, 3 to 10 percent slopes. The Treon soil is on hills and ridges, and the Bayard soil is on alluvial fans and in draws. The two soils could have been mapped separately at the scale used, but for the purposes of this survey they were mapped together because they have similar management requirements.

Included in mapping are small areas of rock outcrop on escarpments, Aberone fine sandy loam on side slopes of hills, and Paoli fine sandy loam in draws. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is brown fine sandy loam about 8 inches thick. The underlying material is pale brown fine sandy loam about 5 inches thick. Semiconsolidated sandstone is at a depth of 13 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

The Bayard soil is very deep and is well drained. It formed in loamy alluvium and colluvium derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 12 inches thick. The upper 11 inches of the subsoil is brown fine sandy loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown fine sandy loam.

Permeability is moderately rapid in the Bayard soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Treon soil is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

The potential plant community on the Bayard soil is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

The Treon soil is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope and the depth to bedrock. The Bayard soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to range seeding and mechanical range renovation. The hazard of wind erosion is a concern. Mechanical range renovation may not be economically feasible because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. Tilling along the contour can reduce the hazard of water erosion in areas that have slopes of more than 6 percent. In areas that have slopes of more than 15 percent, however, tillage for range improvement is not recommended because of the hazard of water erosion.

The Treon soil is poorly suited to windbreaks and environmental plantings. This soil should not be used as a site for these plantings. The main limitations are the depth to bedrock, droughtiness, and the slope. The Bayard soil is moderately suited. The main limitation is the droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. In areas that have slopes of more than 15 percent, however, tillage is not recommended because of the hazard of water erosion. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Treon soil is in capability subclass VIIe, nonirrigated. The Bayard soil is in capability subclass IVe, nonirrigated. The Treon soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site, and the Bayard soil is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

176—Trimad-Blazon complex, 15 to 45 percent slopes

This map unit is on hills and ridges and adjacent alluvial fans. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 65 percent Trimad gravelly loam, 15 to 35 percent slopes, and 30 percent Blazon silt loam, 25 to 45 percent slopes. The Trimad soil is on hills, alluvial fans, and ridges, and the Blazon soil is on hills and ridges. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Poposhia silt loam in draws and on alluvial fans and hills. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown gravelly loam about 8 inches thick. The upper 5 inches of the subsoil is yellowish brown gravelly loam. The next 24 inches of the subsoil is very pale brown very gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability is moderate in the Trimad soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Blazon soil is shallow and well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is brown silt loam about 4 inches thick. The underlying material is pale brown silt loam about 10 inches thick. Semiconsolidated siltstone is at a depth of 14 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Trimad soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds, range seeding, and mechanical range renovation. The slope is the main limitation. The potential for seepage in the Trimad soil and the depth to bedrock in the Blazon soil also limit the development of stockwater ponds.

This unit is poorly suited to windbreaks and environmental plantings because of the slope. The depth to bedrock in the Blazon soil and droughtiness also are limitations.

The Trimad soil is in capability subclass VIe, nonirrigated. The Blazon soil is in capability subclass VIIe, nonirrigated. The Trimad soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site, and the Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

177—Trimad-Blazon, thin solum-Rock outcrop complex, 20 to 45 percent slopes

This map unit is on hills and ridges and adjacent alluvial fans. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 45 percent Trimad loam, 20 to 45 percent slopes; 30 percent Blazon silt loam, 20 to 45 percent slopes; and 20 percent Rock outcrop. The Trimad soil is on hills and alluvial fans, and the Blazon soil is on ridges and hills. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Weed loam in draws. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is very dark grayish brown loam about 7 inches thick. The upper 18 inches of the subsoil is light gray gravelly loam. The next 16 inches of the subsoil is white very gravelly sandy loam. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown very gravelly sandy loam.

Permeability is moderate in the Trimad soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Blazon soil is very shallow and is well drained. It formed in silty alluvium and residuum derived from interbedded siltstone, shale, and sandstone. Typically, the surface layer is dark brown silt loam about 4 inches thick. The underlying material is yellowish brown silt loam about 4 inches thick. Semiconsolidated siltstone is at a depth of 8 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Rock outcrop consists of areas of exposed siltstone, sandstone, or shale bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Trimad soil is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant

community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds, range seeding, and mechanical range renovation. The slope is the main limitation. The potential for seepage in the Trimad soil and the depth to bedrock in the Blazon soil also limit the development of stockwater ponds.

This unit is poorly suited to windbreaks and environmental plantings because of the slope. The depth to bedrock in the Blazon soil and droughtiness also are limitations.

The Trimad and Blazon soils are in capability subclass VIIe, nonirrigated, and the Rock outcrop is in capability subclass VIIIs. The Trimad soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site, and the Blazon soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site.

178—Trimad-Evanston complex, 3 to 30 percent slopes

This map unit is on hills and adjacent alluvial fans and terraces. The native vegetation consists mainly of grasses. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 60 percent Trimad gravelly loam, 6 to 30 percent slopes, and 30 percent Evanston loam, 3 to 15 percent slopes. The Trimad soil is on hills, and the Evanston soil is on terraces, alluvial fans, and hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Poposhia silt loam on alluvial fans and hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown gravelly loam about 8 inches thick. The subsoil to a depth of 60 inches or more is yellowish brown very gravelly sandy loam.

Permeability is moderately rapid in the Trimad soil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper part of the subsoil is yellowish brown clay loam about 15 inches thick. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed.

The Trimad soil is poorly suited to stockwater ponds because of the slope and the potential for seepage. The Evanston soil is moderately well suited to stockwater ponds. The moderate potential for seepage and the slope are the main limitations.

The Trimad soil is poorly suited to range seeding and mechanical range renovation because of the hazard of water erosion and the slope. Tillage for range improvement is not recommended because of the hazard of water erosion.

The Evanston soil is moderately well suited to range seeding and mechanical range renovation. Mechanical range renovation may be used in areas of the Evanston soil where desirable vegetation has beer replaced by sod-forming plants. Maintaining an

adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas. If practical, tilling along the contour for seeding or mechanical range renovation can reduce the hazard of water erosion.

The Trimad soil is moderately suited to windbreaks and environmental plantings. The main limitations are the slope, droughtiness, and the gravel in the upper layers. The Evanston soil is moderately well suited. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Tillage is not recommended on the Trimad soil, however, because of the hazard of water erosion and the gravelly surface layer. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Trimad soil is in capability subclass VIe, nonirrigated, and the Evanston soil is in capability subclass IVe, nonirrigated. This unit is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

179—Trimad-Poposhia complex, dry, 6 to 15 percent slopes

This map unit is on hills and adjacent alluvial fans and in draws. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 45 percent Trimad loam, 10 to 15 percent slopes, and 40 percent Poposhia silt loam, 6 to 10 percent slopes. The Trimad soil is on hills, and the Poposhia soil is in draws and on alluvial fans and hills. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Piezon silt loam on hills and in draws and rock outcrop on the side slopes of ridges. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 5 inches of the subsoil is pale brown gravelly loam. The next 24 inches of the subsoil is very pale brown very gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability is moderate in the Trimad soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium and residuum derived from siltstone. Typically, the surface layer is brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on this unit is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

Proper range management can be achieved on these soils by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

The Trimad soil is poorly suited to stockwater ponds because of the potential for seepage. The Poposhia soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. This unit is moderately well suited to range seeding and mechanical range renovation. The hazard of water erosion is the main limitation. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled

and seeded areas. Tillage for range improvement should be along the contour.

The Trimad soil is moderately suited to windbreaks and environmental plantings. Droughtiness and the slope are the main limitations. The Poposhia soil is moderately well suited. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Tillage is not recommended in areas that have slopes of more than 15 percent, however, because of the hazard of water erosion. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Trimad soil is in capability subclass VIs, nonirrigated. The Poposhia soil is in capability subclass IVe, nonirrigated. This unit is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site.

180—Trimad-Weed-Blazon association, 0 to 15 percent slopes

This map unit is on hills and adjacent alluvial fans and in draws. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is about 40 percent Trimad loam, 6 to 15 percent slopes; 30 percent Weed loam, 0 to 6 percent slopes; and 20 percent Blazon gravelly silt loam, 6 to 15 percent slopes. The Trimad soil is on alluvial fans and hills, the Blazon soil is on hills, and the Weed soil is on alluvial fans and in draws. The three soils could have been mapped separately at the scale used, but for the purposes of this survey they were mapped together because they have similar management requirements.

Included in mapping are small areas of Poposhia silt loam in draws and on alluvial fans and hills and Evanston loam on terraces, alluvial fans, and hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 6 inches of the subsoil is brown gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown very gravelly loam.

Permeability is moderate in the Trimad soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Weed soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the upper part of the surface layer is dark brown loam about 3 inches thick. The next 6 inches of the surface layer is dark brown sandy clay loam. The upper 18 inches of the subsoil is brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is pale brown sandy loam.

Permeability is moderately slow in the Weed soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Blazon soil is shallow and well drained. It formed in silty alluvium and residuum derived from interbedded shale and sandstone. Typically, the surface layer is brown gravelly silt loam about 2 inches thick. The underlying material is yellowish brown silt loam about 13 inches thick. Semiconsolidated, interbedded shale and sandstone are at a depth of 15 inches.

Permeability is moderate in the Blazon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Trimad soil is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

The potential plant community on the Weed soil is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of

the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Blazon soil is mainly bluebunch wheatgrass, little bluestem, and western wheatgrass. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,100 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This unit is poorly suited to stockwater ponds. The main limitation in areas of the Trimad and Weed soils is the potential for seepage. The main limitation in areas of the Blazon soil is the depth to bedrock. The Trimad soil is moderately well suited to mechanical range renovation and range seeding. The main limitation is the hazard of erosion. The Weed soil is well suited to range seeding and mechanical range renovation. The Blazon soil is poorly suited because of droughtiness and the hazard of water erosion.

Mechanical range renovation may be used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be feasible on the Trimad soil, however, because of the number of shrubs in the plant community. Leaving an adequate cover of residue on the surface after planting can reduce the hazard of erosion. In areas that have slopes of more than 6 percent, tillage should be along the contour.

The Trimad soil is moderately suited to windbreaks and environmental plantings. The droughtiness and the gravel in the upper layers are the main limitations. The Weed soil is moderately well suited. The Blazon soil is poorly suited because of the depth to bedrock. This soil should not be used as a site for these plantings. The low annual precipitation should be considered when these plantings are planned on any of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Trimad soil is in capability subclass VIs, nonirrigated. The Weed soil is in capability subclass IVe, nonirrigated. The Blazon soil is in capability subclass VIIe, nonirrigated. The Trimad soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site; the Weed soil is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site; and the Blazon soil is in the Shallow Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

181—Tyzak-Tyzak, thin solum-Rock outcrop complex, 30 to 50 percent slopes

This map unit is on the side slopes of hills, ridges, and hogbacks. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 40 percent Tyzak channery loam, 30 to 45 percent slopes; 30 percent Tyzak very channery loam, thin solum, 35 to 50 percent slopes; and 20 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of Redthayne gravelly loam on side slopes of hills, ridges, and hogbacks. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Tyzak soil is shallow and well drained. It formed in very channery loamy residuum and colluvium derived from limestone interbedded with sandstone and shale. Typically, the surface layer is very dark grayish brown channery loam about 7 inches thick. The subsoil is dark yellowish brown very channery loam about 8 inches thick. Consolidated limestone is at a depth of 15 inches.

Permeability is moderate in the Tyzak soil. The available water capacity is very low. The effective

rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Tyzak, thin solum, soil is very shallow and is well drained. It formed in very channery loamy residuum derived from limestone interbedded with sandstone and shale. Typically, the surface layer is dark brown very channery loam about 7 inches thick. Consolidated limestone is at a depth of 7 inches.

Permeability is moderate in the Tyzak, thin solum, soil. The available water capacity is very low. The effective rooting depth is 4 to 10 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rock outcrop consists of areas of exposed limestone bedrock.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Tyzak soil is mainly needleandthread, bluebunch wheatgrass, western wheatgrass, and true mountainmahogany. The extent of threadleaf sedge and blue grama increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and plains pricklypear will invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,000 pounds in favorable years to 450 pounds in unfavorable years.

The potential plant community on the Tyzak, thin solum, soil is mainly bluebunch wheatgrass, little bluestem, Rocky Mountain juniper, and Indian ricegrass. The extent of forbs and junipers increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and curlycup gumweed will invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production ranges from 600 pounds in favorable years to 300 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed in the more suitable areas. The distribution of livestock may be limited by the rough topography and the availability of water. This unit is poorly suited to range seeding, mechanical range renovation, and stockwater ponds because of the slope and the depth to bedrock.

This unit is poorly suited to windbreaks and environmental plantings because of the slope, the depth to bedrock, and droughtiness.

The Tyzak soils are in capability subclass VIIe, nonirrigated. The Rock outcrop is in capability subclass VIIIs. The Tyzak soil is in the Rocky Hills, 15- to 17-inch precipitation zone, Southern Plains range site, and the Tyzak, thin solum, soil is in the Very Shallow, 15- to 17-inch precipitation zone, Southern Plains range site.

182—Urban land-Albinas complex, 0 to 6 percent slopes

This map unit is on alluvial fans and terraces and in draws. The native vegetation is mainly grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is about 65 percent Urban land and 30 percent Albinas loam. The percentages vary from one delineation to another.

Included in mapping are small areas of Ascalon loam on alluvial fans and terraces. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Albinas soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 4 inches thick. The upper 26 inches of the subsoil is dark brown sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown loam.

Permeability is moderate in the Albinas soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly for housing and urban development.

The Albinas soil is moderately well suited to housing and urban development. The main limitations are the shrink-swell potential and the restricted permeability. The design of streets and building foundations should compensate for the shrink-swell potential. If a septic tank absorption field is used, increasing the size of the field helps to overcome the effects of the restricted permeability.

This unit is moderately well suited to windbreaks

and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Albinas soil is in capability subclass IIIe, nonirrigated.

183—Urban land-Altvan complex, 0 to 6 percent slopes

This map unit is on terraces and alluvial fans. The native vegetation is mainly grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is about 65 percent Urban land and 30 percent Altvan loam. The percentages vary from one delineation to another.

Included in mapping are small areas of Ascalon loam and Wages loam on terraces and Albinas loam in draws. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Altvan soil is very deep and is well drained. It formed in loamy alluvium over sandy alluvium derived from various sources. Typically, the surface layer is brown loam about 4 inches thick. The upper part of the subsoil is brown sandy clay loam about 16 inches thick. The lower part to a depth of 60 inches or more is yellowish brown very gravelly sand.

Permeability is moderate in the upper part of the subsoil in the Altvan soil and very rapid in the lower part of the subsoil. The available water capacity is low. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly for housing and urban development.

The Altvan soil is well suited to housing and urban development. It has few limitations affecting these uses. Cutbanks of excavations are subject to caving. If a septic system is to be used and the density of homesites is high, contamination of ground-water supplies could occur because of the poor filtering capacity of the Altvan soil.

The Altvan soil is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Altvan soil is in capability subclass IIIe, nonirrigated.

184—Urban land-Ascalon complex, 0 to 6 percent slopes

This map unit is on alluvial fans and terraces. The native vegetation is mainly grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is about 65 percent Urban land and 25 percent Ascalon loam. The percentages vary from one delineation to another.

Included in mapping are small areas of Altvan loam and Wages loam on terraces and alluvial fans. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Ascalon soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 8 inches thick. The upper 16 inches of the subsoil is dark yellowish brown sandy clay loam. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown loam.

Permeability is moderate in the Ascalon soil. The available water capacity is high. The effective rooting

depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly for housing and urban development.

The Ascalon soil is moderately well suited to housing and urban development. The main limitations are the shrink-swell potential and the restricted permeability. The design of streets and building foundations should compensate for the shrink-swell potential. If a septic tank absorption field is used, increasing the size of the field helps to overcome the effects of the restricted permeability.

The Ascalon soil is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Ascalon soil is in capability subclass IIIe, nonirrigated.

185—Urban land-Bayard complex, 0 to 15 percent slopes

This map unit is on terraces and alluvial fans. The native vegetation is mainly grasses and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is about 65 percent Urban land and 25 percent Bayard fine sandy loam. The percentages vary from one delineation to another.

Included in mapping are small areas of Paoli fine sandy loam on alluvial fans, on terraces, and in draws. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Bayard soil is very deep and is well drained. It formed in loamy alluvium derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The upper 19 inches of the underlying material is brown fine sandy loam. The lower part of the underlying material to a depth of 60 inches or more is pale brown fine sandy loam.

Permeability is moderately rapid in the Bayard soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly for housing and urban development.

The Bayard soil is well suited to housing and urban development. It has few limitations affecting these uses. The slope is a limitation, however, in areas where it is more than 8 percent. Cutbanks of excavations are subject to caving.

The Bayard soil is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Bayard soil is in capability subclass IVe, nonirrigated.

186—Urban land-Evanston complex, 0 to 6 percent slopes

This map unit is on terraces, alluvial fans, and hills. The native vegetation is mainly grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is about 65 percent Urban land and 30 percent Evanston loam. The percentages vary from one delineation to another.

Included in mapping are small areas of Ipson loam on knolls. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the

surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Evanston soil is very deep and is well drained. It formed in loamy alluvium derived from various sources. Typically, the surface layer is dark brown loam about 3 inches thick. The upper part of the subsoil is brown clay loam about 12 inches thick. The lower part of the subsoil to a depth of 60 inches or more is yellowish brown loam.

Permeability is moderate in the Evanston soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly for housing and urban development.

The Evanston soil is moderately well suited to housing and urban development. The main limitations are the shrink-swell potential and the restricted permeability. The design of streets and building foundations should compensate for the shrink-swell potential. If a septic tank absorption field is used, increasing the size of the field helps to overcome the effects of the restricted permeability.

The Evanston soil is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Evanston soil is in capability subclass IVe, nonirrigated.

187—Urban land-Merden complex, 0 to 3 percent slopes

This map unit is on flood plains. The native vegetation is mainly grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is about 65 percent Urban land and 30 percent Merden silty clay loam. The percentages vary from one delineation to another.

Included in mapping are small areas of poorly drained, loamy soils. These areas make up about 5 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Merden soil is very deep and is poorly drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is very dark grayish brown, slightly saline silty clay loam about 12 inches thick. The subsoil is white, slightly saline silty clay loam about 12 inches thick. The substratum to a depth of 60 inches or more also is white, slightly saline silty clay loam. The subsoil and substratum have dark yellowish brown mottles.

Permeability is slow in the Merden soil. The available water capacity is high. The effective rooting depth is 6 to 24 inches for most plants, but it is 60 inches or more for plants that can tolerate a high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion also is slight. This soil is subject to frequent long periods of flooding in April and May. Depth to the seasonal high water table is 6 to 24 inches from April through November.

This unit is used mainly for housing and urban development.

The Merden soil is poorly suited to housing and urban development. The main limitations are the high water table and the flooding. This soil is not recommended as a site for buildings because of the flooding. It also is not recommended for dwellings with basements because of the high water table. Septic tank absorption fields do not function properly because of the high water table.

The Merden soil is moderately suited to windbreaks and environmental plantings. The main limitations are the wetness and the salinity. Trees and shrubs that can tolerate these conditions should be planted. Spraying the area between tree rows with herbicides helps to control competition from weeds. Weed barriers may be used along tree rows to minimize competition. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds.

The Merden soil is in capability subclass IVw, nonirrigated. It is a hydric soil.

188—Urban land-Poposhia complex, 0 to 6 percent slopes

This map unit is on valley floors, alluvial fans, and knolls. The native vegetation is mainly grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is about 65 percent Urban land and 25 percent Poposhia silt loam. The percentages vary from one delineation to another.

Included in mapping are small areas of Piezon silt loam and Blazon silt loam on hills. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly for housing and urban development.

The Poposhia soil is moderately well suited to housing and urban development. It has few limitations affecting most urban uses. The restricted permeability is a limitation on sites for septic tank absorption fields. Increasing the size of the absorption field helps to overcome the restricted permeability.

The Poposhia soil is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

The Poposhia soil is in capability subclass IVe, nonirrigated.

189—Urban land-Poposhia-Trimad complex, 3 to 15 percent slopes

This map unit is on alluvial fans and hills. The native vegetation is mainly grasses, forbs, and shrubs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

This unit is about 60 percent Urban land, 3 to 15 percent slopes; 15 percent Poposhia silt loam, 3 to 10 percent slopes; and 15 percent Trimad loam, 6 to 15 percent slopes. The percentages vary from one delineation to another.

Included in mapping are small areas of Piezon silt loam on hills and rock outcrop on the side slopes of ridges. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Urban land consists of areas where most of the surface is covered by streets, parking lots, buildings, and other structures. In areas where the surface is not covered, the original soil has commonly been altered by excavation or built up with fill from various sources.

The Poposhia soil is very deep and is well drained. It formed in silty alluvium derived from various sources. Typically, the surface layer is brown silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate in the Poposhia soil. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

The Trimad soil is very deep and is well drained. It formed in very gravelly loamy alluvium derived from various sources. Typically, the upper part of the surface layer is dark brown loam about 3 inches thick. The lower 7 inches is brown gravelly loam. The upper 24 inches of the subsoil is very pale brown very gravelly loam. The lower part of the subsoil to a depth of 60 inches or more is very pale brown very gravelly sandy loam.

Permeability is moderate in the Trimad soil. The available water capacity also is moderate. The effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion also is moderate.

This unit is used mainly for housing and urban development.

The Poposhia soil is moderately well suited to housing and urban development. The slope is the main limitation affecting most urban uses. The restricted permeability also is a limitation on sites for septic tank absorption fields. Increasing the size of the absorption fields helps to overcome the restricted permeability.

The Trimad soil is moderately well suited to housing and urban development. The main limitations are the slope and the content of gravel, which hinders excavating and landscaping.

The Poposhia soil is moderately well suited to windbreaks and environmental plantings. The Trimad soil is moderately suited. Droughtiness is the main limitation. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize the competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted at a right angle to the prevailing winds. In areas that have slopes of more than 6 percent, windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Poposhia soil is in capability subclass IVe, nonirrigated, and the Trimad soil is in capability subclass VIs, nonirrigated.

190—Valent loamy fine sand, moist, 0 to 6 percent slopes

This very deep, excessively drained soil is on dunes and hills (fig. 4). It formed in sandy eolian deposits derived from sandstone. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Otero and Tassel fine sandy loams on hills and knolls. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Valent soil is light yellowish brown loamy fine sand about 10 inches thick. The underlying material to a depth of 60 inches or more also is light yellowish brown loamy fine sand.

Permeability is rapid. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat. Some areas are used as irrigated hayland.

This unit is moderately well suited to irrigated hay. The main limitations are droughtiness and the hazard of wind erosion. Frequent irrigation is required because of the droughtiness. A sprinkler system is the most suitable method of irrigation. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community is mainly needleandthread, sand bluestem, prairie junegrass, Indian ricegrass, and sand sagebrush. The extent of sand sagebrush, needleleaf sedge, and green sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 900 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is poorly suited to range seeding and mechanical range renovation. The hazard of wind erosion is the main limitation. Tillage for range improvement is not recommended. Interseeding and preparing the seedbed by band spraying of herbicides are suitable practices. Mechanical range renovation may not be economically feasible because of the coarse texture of the surface layer.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and the droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize

Figure 4.—A typical landscape in an area of Valent loamy fine sand, moist, 0 to 6 percent slopes. Even minor disturbances of the vegetative cover can result in severe wind erosion. Blowouts occur readily and are extremely difficult to reclaim.

competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass VIe, nonirrigated, and IVe, irrigated. It is in the Sands, 15- to 17-inch precipitation zone, Southern Plains range site.

191—Valent-Treon complex, 6 to 30 percent slopes

This map unit is on hills, dunes, and ridges. The native vegetation consists mainly of grasses, forbs, and shrubs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Valent loamy fine sand, 6 to 15 percent slopes, and 30 percent Treon fine sandy loam, 10 to 30 percent slopes. The Valent soil is on dunes and hills, and the Treon soil is on hills and ridges. The two soils occur as areas so intricately intermingled that it was not practical to map them separately at the scale used.

Included in mapping are small areas of rock outcrop on knolls. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

The Valent soil is very deep and is excessively drained. It formed in sandy eolian deposits derived from sandstone. Typically, the surface layer is brown loamy fine sand about 8 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown loamy fine sand.

Permeability is rapid in the Valent soil. The available water capacity is moderate. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

The Treon soil is shallow and well drained. It formed in loamy residuum derived from sandstone. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The underlying material is yellowish brown fine sandy loam. It is about 8 inches thick. Semiconsolidated sandstone is at a depth of 15 inches.

Permeability is moderately rapid in the Treon soil. The available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion also is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community on the Valent soil is mainly sand bluestem, prairie junegrass, needleandthread, Indian ricegrass, and sand sagebrush. The extent of needleleaf sedge, green sagewort, and sand sagebrush increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production ranges from 2,000 pounds in favorable years to 900 pounds in unfavorable years.

The potential plant community on the Treon soil is mainly little bluestem, needleandthread, western wheatgrass, and Indian ricegrass. The extent of threadleaf sedge and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and annual grasses will invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,500 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved on this unit by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the rough topography and the availability of water.

This unit is poorly suited to stockwater ponds because of the potential for seepage in areas of the Valent soil and the slope and the depth to bedrock in areas of the Treon soil. This unit is poorly suited to range seeding and mechanical range renovation because of the hazard of wind erosion. The slope in areas of the Treon soil also is a limitation. Tillage for range improvement is not recommended. Interseeding and preparing the seedbed by band spraying of herbicides are suitable practices. Mechanical range renovation may not be economically feasible because of the coarse texture of the surface layer of these soils.

The Treon soil is poorly suited to windbreaks and environmental plantings because of the depth to bedrock and the slope. This soil should not be used as a site for these plantings. The Valent soil is moderately suited. The main limitation is droughtiness. The low annual precipitation should be considered when these plantings are planned on either of these soils. If water is available, trees and shrubs should be irrigated. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage. Windbreaks should be planted on the contour and at as close to a right angle to the prevailing winds as possible.

The Valent soil is in capability subclass VIe, nonirrigated. The Treon soil is in capability subclass VIIe, nonirrigated. The Valent soil is in the Sands, 15- to 17-inch precipitation zone, Southern Plains range site, and the Treon soil is in the Shallow Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

192—Vetal fine sandy loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and in draws. It formed in loamy alluvium derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Paoli fine sandy loam on alluvial fans and in draws and Bayard

fine sandy loam on terraces and alluvial fans. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the upper part of the surface layer of the Vetal soil is dark grayish brown fine sandy loam about 10 inches thick. The lower part of the surface layer is dark brown fine sandy loam about 17 inches thick. The underlying material to a depth of 60 inches or more is brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to range seeding and mechanical range renovation. The main limitation is the hazard of wind erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

193—Vetal loamy fine sand, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and in draws. It formed in loamy alluvium derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Otero and Paoli fine sandy loams on alluvial fans, in draws, and on knolls. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the upper part of the surface layer in the Vetal soil is dark brown loamy fine sand about 6 inches thick. The lower 26 inches of the surface layer is dark brown fine sandy loam. The underlying material to a depth of 60 inches or more is brown fine sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both.

Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to range seeding and mechanical range renovation. The main limitation is the hazard of wind erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

194—Vonalee fine sandy loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and terraces. It formed in loamy alluvium derived from sandstone. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Moskee fine sandy loam on alluvial fans and terraces. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Vonalee soil is yellowish brown fine sandy loam about 6 inches thick. The upper 18 inches of the subsoil also is yellowish brown fine sandy loam. The lower part of the subsoil to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability is moderately rapid. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, little bluestem, prairie sandreed, thickspike wheatgrass, and Indian ricegrass. The extent of blue grama, threadleaf sedge, and fringed sagewort increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, annual forbs and grasses will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,800 pounds in favorable years to 800 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is moderately well suited to range seeding and mechanical range renovation. The main limitation is the hazard of wind erosion. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. It may not be economically feasible, however, because of the coarse texture of the surface layer. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately suited to windbreaks and environmental plantings. The main limitations are the low annual precipitation and droughtiness. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion and water erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated. It is in the Sandy, 15- to 17-inch precipitation zone, Southern Plains range site.

195—Wages loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans, terraces, and knolls. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Included in mapping are small areas of Ascalon loam on alluvial fans and terraces and Albinas loam in swales and draws. These areas make up about 15 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Wages soil is dark brown loam about 7 inches thick. The upper part of the subsoil is brown clay loam about 6 inches thick. The lower part to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability is moderately slow. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland, nonirrigated cropland, irrigated hayland, or wildlife habitat.

This unit is moderately well suited to nonirrigated crops. The main limitations are the low annual precipitation and the hazard of wind erosion. Because the amount of precipitation is insufficient for annual crops, a cropping system that includes small grain crops in rotation with summer fallow is most suitable. Wind erosion can be controlled by stripcropping at a right angle to the prevailing winds, by leaving the soil surface rough, and by maintaining a cover of crop residue on the surface after tillage.

This unit is well suited to irrigated hay. A sprinkler irrigation system is suitable. A furrow irrigation system is suitable in nearly level areas. Adjusting applications of irrigation water according to the available water capacity and the needs of the crop helps to prevent overirrigation and the leaching of plant nutrients. Grasses respond to nitrogen fertilization, and legumes respond to fertilization with phosphorus. Fertilizers should be applied according to the results of soil tests.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. If the range condition continues to deteriorate, broom snakeweed and cheatgrass will invade. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is poorly suited to stockwater ponds because of the potential for seepage. It is well suited to range seeding and mechanical range renovation. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IIIe, nonirrigated and irrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

196—Weed loam, 0 to 6 percent slopes

This very deep, well drained soil is on alluvial fans and in draws. It formed in loamy alluvium derived from various sources. The native vegetation consists mainly of grasses and forbs. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

Included in mapping are small areas of Evanston loam on terraces and Ipson loam on knolls. These areas make up about 10 percent of the total acreage. The percentage varies from one delineation to another.

Typically, the surface layer of the Weed soil is dark brown loam about 6 inches thick. The upper 8 inches of the subsoil is dark brown sandy clay loam. The next

14 inches is dark brown clay loam. The lower part of the subsoil to a depth of 60 inches or more is dark brown sandy clay loam.

Permeability is moderately slow. The available water capacity is high. The effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland or wildlife habitat.

The potential plant community is mainly needleandthread, western wheatgrass, blue grama, and little bluestem. The extent of blue grama and threadleaf sedge increases when the condition of the range begins to deteriorate. Broom snakeweed and cheatgrass will invade if the range condition continues to deteriorate. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production ranges from 1,900 pounds in favorable years to 700 pounds in unfavorable years.

Proper range management can be achieved by implementing a planned grazing system, which may involve installing fences, herding livestock, or both. Adequate stockwater facilities are critical to proper management and may need to be developed. The distribution of livestock may be limited by the availability of water.

This soil is moderately well suited to stockwater ponds. The moderate potential for seepage is the main limitation. The soil is well suited to range seeding and mechanical range renovation. Mechanical range renovation is used in areas where desirable vegetation has been replaced by sod-forming plants. Maintaining an adequate cover of crop residue on the surface after planting reduces the hazard of wind erosion in tilled and seeded areas.

This unit is moderately well suited to windbreaks and environmental plantings. The main limitation is the low annual precipitation. Windbreaks should be planted at a right angle to the prevailing winds. Trees and shrubs should be irrigated if water is available. A drip irrigation system is suitable. Cultivating the area between the rows of trees and shrubs or spraying it with herbicides helps to minimize competition from weeds. Weed barriers may be used to minimize competition and to conserve soil moisture. These areas should be protected from wind erosion by using stubble mulch tillage.

This unit is in capability subclass IVe, nonirrigated. It is in the Loamy, 15- to 17-inch precipitation zone, Southern Plains range site.

Prime Farmland

In this section, prime farmland is defined and the prime farmland soils in the survey area are listed.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U. S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U. S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other uses. They either are used for producing food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and growing season are favorable, and the level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 1,000 acres, or nearly 0.1 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The following map units meet the soil requirements for prime farmland where irrigated with an adequate water supply. Onsite investigation may be needed to determine whether or not the soil meets the irrigation requirement for prime farmland.

100—Albinas loam, 0 to 6 percent slopes
101—Altvan loam, 0 to 6 percent slopes
104—Ascalon loam, 0 to 6 percent slopes

Some areas of the following map units may meet the requirements for prime farmland. For any area of these map units to be prime farmland, the area must (1) have a slope of 6 percent or less and (2) be irrigated with an adequate water supply. Onsite investigation is required to determine whether or not an area of these map units meets these requirements for prime farmland.

105—Bayard fine sandy loam, 0 to 15 percent slopes
107—Bayard-Paoli fine sandy loams, 0 to 10 percent slopes

The location of each map unit is shown on the detailed soil maps. Soil qualities that affect use and management are described in the section "Detailed Soil Map Units." These lists do not constitute a recommendation for a particular land use.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland or woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Charles A. Hogelin, state conservation agronomist, Natural Resources Conservation Service, contributed to this section.

General management needed for crops and for hay and pasture is suggested in this section. Also, the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Most of the cropland in the survey area is nonirrigated. Winter wheat is the most common crop. Summer fallow in alternate years is used as a moisture conservation practice in areas where winter wheat is produced. About 8,000 acres is used for the production of winter wheat in the survey area.

Wind erosion is a major management concern on the nonirrigated cropland in the survey area. Water erosion can also be a hazard. Resource management systems that include such practices as crop residue management, a conservation cropping sequence, nutrient management, and pest management can be applied. Wind stripcropping, conservation tillage, conservation cover, terraces, diversions, field windbreaks, and other practices may be used to complement the basic conservation system.

About 2,000 acres in the survey area is used for the production of irrigated pasture and hayland. Pasture and hayland resource management systems involve growing crops in accordance with needed cultural and management practices, such as using rotations that include grasses and legumes, returning crop residue to the soil, using proper tillage methods, providing adequate fertilization, and controlling weeds and pests.

Several cropping sequences are used in the survey area. The dominant systems are alfalfa or alfalfa/grass mixtures for 5 to 10 years, small grain (typically oats) for 1 or 2 years, and then alfalfa or alfalfa/grass with a protective nurse crop of oats; permanent seedings of improved grass species for pastures and haylands and native grass meadows; and winter wheat in rotation with summer fallow.

In the following paragraphs the principal soil management practices needed in the survey area are described in general terms. Although the soils differ in

management needs, certain practices apply to all of the irrigated and cultivated soils.

Erosion control prevents the excessive wearing away of the land surface by wind and running water. Protecting the surface layer is important because this layer contains most of the organic matter and generally is more fertile than the subsoil. Wind erosion and erosion from rain storms can be controlled by maintaining a cover of crop residue or living plants on the soil surface. Applying irrigation water in nonerosive velocities and volumes in combination with a system of contour ditches or sprinklers helps to control water erosion on irrigated soils.

The addition of plant nutrients is normally necessary in order to maintain high yields. Most of the irrigated soils used for crops in this survey area respond well to applications of fertilizer. The specific fertilizer needed depends on the crop grown and the nutrient content of the soil. Applying fertilizer that contains nitrogen and phosphorus increases yields of small grain and aids in establishing alfalfa. Sufficient phosphorus for the life of the alfalfa stand should be added, except where the soil contains enough available phosphorus. Manure adds some nitrogen, phosphate, and potassium to the soil and promotes good tilth. Soil tests should be used as a basis for determining fertilizer requirements. Realistic yield goals should be set, and the fertilizer should be applied accordingly. When feasible, split applications of nitrogen help to minimize possible nitrogen losses into surface water or ground water.

Pest management involves controlling weeds, insects, or disease. The methods used for pest control should minimize the risk to the environment.

Irrigation water management is the application of irrigation water at rates and in amounts that ensure high crop production and minimize soil, water, and nutrient losses. Water should be applied according to crop needs and soil characteristics.

Pasture management includes grazing at a rate that maintains the quality of grasses and legumes. Adjusting the stocking rates or the season of use allows the maximum growth and survival of plants.

Proper hayland management prolongs the life of desirable forage plants, maintains or improves the quality and quantity of the forage, protects the soil, and minimizes water loss. Management includes the establishment and renovation of hay fields with long-term stands of adapted plants.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, ranchers, conservationists, and Extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue and barnyard manure; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for

interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961). Only class and subclass are used in this survey.

The capability class or subclass of each component of the detailed soil map units is shown in table 5 and in the section "Detailed Soil Map Units."

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are suitability groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is a climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Water Quality in Agriculture

The potential for impacting the quality of surface water or ground water should be considered in the planning and management of all agricultural operations. The potential for impacting water quality exists whenever pesticides, fertilizers, and manure are used in proximity to surface water or aquifers. The main hazard is the removal of these materials from the application site by surface water runoff and soil leaching.

Impairment by Pesticides

Water quality can be impaired if pesticides are leached below the root zone or enter a water body when they are attached to suspended sediment or in solution of runoff waters. The potential for loss of pesticides by surface water runoff or leaching is a combined function of soil and pesticide properties, climate factors, the kind of crop, and the application method.

To minimize the potential for impairment of the quality of surface water or ground water by pesticides, the use of a pest management system is recommended. Pest management systems target infestations of weeds, insects, or disease. These systems reduce the adverse effects of pest infestations on plant growth and crop production while minimizing the adverse effects on environmental resources. The systems utilize the most appropriate measures or combinations of measures for pest control, including biological, cultural, and chemical measures, and they include consideration of environmental effects, health hazards, and economic benefits. Field scouting and economic thresholds are used to determine whether pesticides should be used and the time of application. Only necessary and properly timed applications of pesticides are utilized.

In a pest management system, the time for the pesticide application is chosen with consideration of the soil moisture conditions, anticipated weather conditions, and irrigation schedules. The proper timing of applications reduces the potential for loss of pesticides by leaching or surface water runoff. Erosion-control practices are used to minimize soil loss, surface water runoff, and the transport of adsorbed or dissolved pesticides to surface waters.

Characteristics of pesticides, such as solubility, toxicity, degradation, and absorption, are considered in pesticide selection. Soil, geology, depth to a water table, proximity to surface water, topography, and climate are site characteristics that affect pesticide transport. Consideration of these pesticide properties and site characteristics when pesticides are selected

helps to minimize their potential to impair the quality of surface water and ground water.

In table 6, the soils in the survey area are rated according to their relative potential for pesticide loss caused by leaching and by surface runoff. These ratings and the information on pesticide properties, climate, kind of crop, and application method are used to determine the potential for water-quality impairment.

The soil leaching and surface loss potential ratings given in table 6 were developed from information on soil parameters. These ratings represent the relative capacity of a soil to retain a pesticide at the point of application, regardless of management or climatic inputs. The properties of pesticides, climatic factors, kind of crop, and application method were not considered in the development of these ratings.

The soil properties and features used in the development of the ratings for potential pesticide loss caused by soil leaching are those that affect the infiltration rate, permeability, and the pesticide attenuation capacity. These soil properties are soil texture, surface layer thickness, organic matter content, structure, bulk density, permeability of the soil or bedrock, shrink-swell potential, depth to bedrock, depth to a water table, and slope. The infiltration rate is interpreted from the hydrologic soil group and the slope.

The soil properties and features considered in the ratings for potential pesticide loss caused by surface runoff are those that affect the rates of runoff and erosion. They include soil texture, organic matter content, structure, particle-size distribution, permeability, restricting layers, soil depth, depth to a water table, flooding, slope, and shrink-swell potential.

A rating of *slight* indicates a slight probability that loss of pesticides will occur if pesticides with very small, small, or medium loss potentials are used and a moderate probability that pesticide loss will occur if pesticides with a large potential for loss are used. A rating of *moderate* indicates a slight probability that loss of pesticides will occur if pesticides with very small or small loss potentials are used and a moderate probability that pesticide loss will occur if pesticides with a medium or large potential for loss are used. A rating of *severe* indicates a moderate probability that loss of pesticides will occur if pesticides with very small or small loss potentials are used and a high probability that pesticide loss will occur if pesticides with a medium or large potential for loss are used.

In these ratings, it is assumed that the pesticide has been applied to bare soil by either surface or aerial methods. If the pesticide is applied onto a field of a growing crop or weeds, the potential for pesticide loss will be lower. Information on pesticide properties can be obtained from the local office of the Natural Resources Conservation Service or the Extension Service or from pesticide dealers.

If the possibility for pesticide loss caused by soil leaching or surface runoff is identified, an onsite evaluation is usually necessary to determine the potential impacts on water quality. If water quality will be affected, the land user should consider alternative pesticides, alternative management practices, alternative application methods, or cultural or biological pest-control methods to reduce the potential for pesticide losses caused by leaching or by surface runoff.

Impairment by Nutrients

An adequate and timely supply of nutrients is necessary for maximum crop production. It is important that nutrients added to the soil are efficiently used because nutrient amounts in excess of crop needs can result in pollution. The rate of fertilizer application is important in minimizing the losses caused by leaching and by surface runoff. The amount of fertilizer applied should be based on a realistic yield goal. A proper balance of essential nutrients and soil moisture is necessary. A deficiency of one element may reduce the use of other nutrients by the crop. The nutrients that have not been used by the crop are available for offsite transport. Soil tests are an important guide to the proper use of fertilizers. These tests, combined with information about soil type, previous cropping history, and anticipated soil moisture level, should be used to estimate fertilizer requirements. Growing crops that require a small amount of nitrogen, such as legumes, in rotation with crops that require a large amount of nitrogen reduces the potential for nutrient loss. Ammonium nitrogen fertilizers, such as anhydrous ammonia, can be used to reduce nitrate leaching. Wherever practical, incorporating all fertilizer into the soil can minimize loss caused by volatilization and by surface runoff.

The proper timing of fertilizer applications can be effective in reducing the potential loss of nutrients. Nitrogen should be applied as closely as possible to the plant demand periods. Split applications of nitrogen, especially on sandy soils, can minimize leaching losses. Half of the required amount should be applied at planting time and the other half at the critical growth stage of the crop.

The proper management of irrigation water can reduce the amount of nitrogen leached from irrigated fields. Irrigation efficiency is needed at all times to reduce the amount of leaching resulting from deep percolation.

Practices that control erosion and runoff reduce the

amount of nitrogen or phosphorus transported to surface waters. Maintaining adequate amounts of crop residue on the surface and maintaining good soil tilth increase the rate of water infiltration and reduce the potential for nutrient loss caused by surface runoff.

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils, vegetation, and water.

Table 7 shows, for each soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Explanation of the column headings in table 7 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table also are important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Windbreaks and Environmental Plantings

Richard Rintamaki, state biologist, Natural Resources Conservation Service, Casper, Wyoming, assisted in the preparation of this section.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing winds and at specific intervals across the field. The interval depends on the erodibility of the soil and snow management objectives. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings, reduce building heating and cooling costs, and reduce noise. Tree and shrub plantings can also reduce wave action on ponds and harvest snow for stockwater, wildlife water, and irrigation water.

Tables 8 and 9 show the height that selected adaptable trees and shrubs are expected to reach, given adequate care, in 20 years for each represented soil group and planting zone. The windbreak suitability group and planting zone designation for every soil in a detailed soil map unit are listed in table 10. Definitions of suitability groups and planting zones are given below. This information can be used as a guide in planning windbreaks and other plantings of trees and shrubs.

Adaptability for planting trees and shrubs in Wyoming was based on the tolerance of each plant species for the minimum and maximum air temperatures, soil temperatures of an area, and data and observations collected from woody plant material trials and existing windbreaks.

Additional information on planning windbreaks and other environmental plantings as well as planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service, the local conservation district, the Cooperative Extension Service, or a commercial nursery.

The windbreak suitability groups in this survey area are described in the following paragraphs.

Windbreak suitability group 1.—The soils in this group are very deep or deep and are somewhat poorly drained to well drained. They have a loamy surface layer and subsoil and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is 3 to 5 feet, or the site receives beneficial moisture from surrounding landscapes or from frequent flooding.

This group is well suited to windbreaks and environmental plantings. Planting may be delayed for a short period in spring because of wetness. The water table provides moisture to the trees and shrubs once the roots have become sufficiently established.

Windbreak suitability group 1H.—The soils in this group are organic (peat) and are moderately deep to very deep. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9 and the electrical conductivity is less than 4 millimhos per centimeter. Depth to a water table during the growing season is 3 to 5 feet, or the site receives beneficial moisture from surrounding landscapes or from frequent flooding.

This group is moderately well suited to windbreaks and environmental plantings. Planting may be delayed for a short period in spring because of the wetness. Because these soils are dominantly peat, special planting considerations are necessary. The water table provides moisture to the trees and shrubs once the roots have become sufficiently established.

Windbreak suitability group 1KK.—The soils in this group are very deep or deep and are somewhat poorly drained to well drained. They have a loamy surface layer and subsoil and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is 3 to 5 feet, or the site receives beneficial moisture from surrounding landscapes or from frequent flooding.

This group is moderately suited to windbreaks and environmental plantings. Planting may be delayed for a short period in the spring because of wetness. The amount of carbonates and the high pH significantly limit the selection and rate of growth of trees and shrubs. The water table provides moisture to the trees and shrubs once the roots have become sufficiently established.

Windbreak suitability group 1KW.—The soils in this group are very deep or deep and are somewhat poorly drained to well drained. They have a loamy surface layer and subsoil and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is 3 to 5 feet, or the site receives beneficial moisture from surrounding landscapes or from frequent flooding.

This group is moderately well suited to windbreaks and environmental plantings. Planting may be delayed for a short period in the spring because of wetness. The amount of carbonates and the high pH slightly limit the selection and rate of growth of trees and shrubs. The water table provides moisture to the trees and shrubs once the roots have become sufficiently established.

Windbreak suitability group 2.—The soils in this group are very deep or deep, are poorly drained or somewhat poorly drained, and are excessively wet or ponded during the spring or overflow periods. These soils range from sandy to clayey. The content of rock fragments may range to 60 percent by volume. The

available water capacity is more than 2 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is 1.5 to 3.0 feet.

This group is moderately well suited to windbreaks and environmental plantings. Special planting considerations are necessary because these soils are wet during the growing season. The wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on this limitation.

Windbreak suitability group 2H.—The soils in this group are organic (peat), are very deep or deep, and are poorly drained or somewhat poorly drained. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is less than 1 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is 1.5 to 3.0 feet.

This group is moderately suited to windbreaks and environmental plantings. Because these soils are wet and are dominantly peat, special planting considerations are necessary. The wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on this limitation.

Windbreak suitability group 2KK.—The soils in this group are very deep or deep, are poorly drained or somewhat poorly drained, and are excessively wet or ponded during the spring or overflow periods. These soils range from sandy to clayey. The content of rock fragments may range to 60 percent by volume. The available water capacity is more than 2 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is 1.5 to 3.0 feet.

This group is moderately suited to windbreaks and environmental plantings. Special planting considerations are necessary because these soils are wet during the growing season. The amount of carbonates and the high pH significantly limit the rate of growth of trees and shrubs. The wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on these limitations.

Windbreak suitability group 2KW.—The soils in this group are very deep or deep, are poorly drained or somewhat poorly drained, and are excessively wet or ponded during the spring or overflow periods. These soils range from sandy to clayey. The content of rock fragments may range to 60 percent by volume. The available water capacity is more than 2 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is 1.5 to 3.0 feet.

This group is moderately suited to windbreaks and environmental plantings. Special planting considerations are necessary because these soils are wet during the growing season. The amount of carbonates and the high pH moderately limit the rate of growth of trees and shrubs. The wetness limits the rooting depth and survival of some species. The selection of trees and shrubs should be based on these limitations.

Windbreak suitability group 3.—The soils in this group are very deep or deep and are moderately well drained or well drained. They have a loamy surface layer and subsoil and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is well suited to windbreaks and environmental plantings.

Windbreak suitability group 4.—The soils in this group are moderately deep to very deep and are moderately well drained or well drained. The soils are loamy in the upper 8 to 20 inches. Below this depth the soils are clayey. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity to underlying bedrock is more than 5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately well suited to windbreaks and environmental plantings. A high content of clay in the lower part of the soil moderately limits the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group also is a limiting factor.

Windbreak suitability group 4C.—The soils in this group are moderately deep to very deep and are moderately well drained or well drained. These soils typically are clayey throughout, but the upper 8 inches may be loamy. The content of rock fragments may

range to 60 percent by volume throughout. The available water capacity to underlying bedrock or other restrictive layers is more than 3.75 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. The high content of clay limits the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group also is a limiting factor. Because of the high content of clay, extra care is needed to ensure that the soil is firmly packed around the roots when trees and shrubs are planted.

Windbreak suitability group 4CK.—The soils in this group are moderately deep to very deep and are moderately well drained or well drained. These soils typically are clayey throughout, but the upper 8 inches may be loamy. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity to underlying bedrock or other restrictive layers is more than 3.75 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. The high content of clay, the high pH, and the amount of carbonates moderately limit the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group also is a limiting factor. Because of the high content of clay, extra care is needed to ensure that the soil is firmly packed around the roots when trees and shrubs are planted.

Windbreak suitability group 4K.—The soils in this group are moderately deep to very deep and are moderately well drained or well drained. The upper 8 to 20 inches of the soil is loamy. Below this depth the soils are clayey. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity to underlying bedrock or other restrictive layers is more than 5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. The high content of clay in the lower part of the soil, the amount of carbonates, and the high pH moderately limit the selection and rate of growth of trees and shrubs. The droughtiness of the moderately deep soils in this group also is a limiting factor.

Windbreak suitability group 5.—The soils in this group are very deep or deep and are moderately well drained or well drained. They have a loamy surface layer and subsoil. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity ranges from 3.75 to 7.5 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately well suited to windbreaks and environmental plantings. Droughtiness moderately limits the selection and rate of growth of trees and shrubs.

Windbreak suitability group 5K.—The soils in this group are very deep or deep and are moderately well drained or well drained. They have a loamy surface layer and subsoil. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity ranges from 3.75 to 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. The amount of carbonates, the high pH, and droughtiness moderately limit the selection of trees and shrubs.

Windbreak suitability group 5KK.—The soils in this group are very deep or deep and are moderately well drained or well drained. They have a loamy surface layer and subsoil. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity ranges from 3.75 to 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The very high amount of carbonates, the high pH, and droughtiness significantly limit the selection of trees and shrubs.

Windbreak suitability group 6.—The soils in this group are moderately deep over sand, gravel, and

similar layers having permeability of more than 20 inches per hour or other layers that restrict the penetration of roots. These soils are well drained to excessively drained. The upper part of the soil is loamy and may contain up to 60 percent rock fragments by volume. The available water capacity to underlying bedrock or other restrictive layers ranges from 2.0 to 3.75 inches. In the upper 12 inches of the soil, the pH is less than 7.9, the electrical conductivity is less than 2 millimhos per centimeter, and the calcium carbonate equivalent ranges from 0 to 5 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. Droughtiness significantly limits the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs.

Windbreak suitability group 6D.—The soils in this group are moderately deep over an impervious layer. They are well drained to excessively drained. They have a loamy or clayey surface layer and subsoil. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity to underlying bedrock or other restrictive layers is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent ranges from 0 to 5 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. Droughtiness moderately limits the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6DK.—The soils in this group are moderately deep over an impervious layer. They are well drained to excessively drained. They have a loamy or clayey surface layer and subsoil. The content of rock fragments may range to 60 percent by volume throughout. The available water capacity to underlying bedrock or other restrictive layers is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. The amount of carbonates, the high pH, and droughtiness moderately limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6G.—The soils in this group are moderately deep over sand, gravel, and similar layers having permeability of more than 20 inches per hour. These soils are well drained to excessively drained. The surface layer and subsoil are loamy or clayey and may contain up to 60 percent rock fragments by volume. The available water capacity is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent is less than 5 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. Droughtiness moderately limits the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6GK.—The soils in this group are moderately deep over sand, gravel, and similar layers having permeability of more than 20 inches per hour. They are well drained to excessively drained. The surface layer and subsoil are loamy or clayey and may contain up to 60 percent rock fragments by volume. The available water capacity is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is moderately suited to windbreaks and environmental plantings. The amount of carbonates, the high pH, and droughtiness moderately limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6GKK.—The soils in this group are moderately deep over sand, gravel, and similar layers having permeability of more than 20 inches per hour. They are well drained to excessively drained. The surface layer and subsoil are loamy or clayey and may contain up to 60 percent rock fragments by volume. The available water capacity is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The very high amount of carbonates, the high pH, and droughtiness significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 6K.—The soils in this group are moderately deep over sand, gravel, and similar layers having permeability of more than 20 inches per hour or other layers that restrict the penetration of roots. These soils are well drained to excessively drained. The surface layer and subsoil are loamy or clayey and may contain up to 60 percent rock fragments by volume. The available water capacity is 2.0 to 3.75 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 5 to 15 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The amount of carbonates, the high pH, and droughtiness significantly limit the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs.

Windbreak suitability group 6KK.—The soils in this group are moderately deep over sand, gravel, and similar layers having permeability of more than 20 inches per hour or other layers that restrict the penetration of roots. These soils are well drained to excessively drained. The surface layer and subsoil are loamy or clayey and may contain up to 60 percent rock fragments by volume. The available water capacity is 2.0 to 3.75 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is less than 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The very high amount of carbonates, the high pH, and droughtiness significantly limit the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs.

Windbreak suitability group 7.—The soils in this group are very deep or deep and are well drained to excessively drained. These soils are sandy and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 2 inches but is commonly less than 5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent ranges from 0 to 5 percent, the pH is less than 7.9, and the electrical conductivity is less than 2 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks in areas where supplemental watering is not practical. Droughtiness significantly limits the selection and rate of growth of trees and shrubs. Providing permanent supplemental water is recommended for successful establishment and growth of trees and shrubs. Wind erosion at or near the planting site can limit the health and vigor of young windbreaks. Because of the sandy surface layer, specialized site preparation, planting methods, and management are needed to ensure successful tree and shrub plantings.

Windbreak suitability group 8.—The soils in this group are very deep or deep and are moderately well drained or well drained. They have a loamy surface layer and subsoil and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the calcium carbonate equivalent ranges from 5 to 15 percent, the pH ranges from 7.9 to 8.4, and the electrical conductivity is as much as 4 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is moderately well suited to windbreaks and environmental plantings. The amount of carbonates and the high pH slightly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 8K.—The soils in this group are very deep or deep and are moderately well drained or well drained. They have a loamy surface layer and subsoil and have less than 35 percent rock fragments by volume throughout. The available water capacity is more than 7.5 inches. In the upper 12 inches of the soil, the pH ranges from 7.9 to 8.4, the electrical conductivity is as much as 4 millimhos per centimeter, and the calcium carbonate equivalent ranges from 15 to 40 percent. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The amount of carbonates and the high pH significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 9C.—The soils in this group are moderately deep to very deep and are moderately well drained or well drained. These soils typically are clayey and have less than 35 percent rock fragments by volume throughout. However, the upper 8 inches is loamy. The available water capacity to underlying bedrock or other restrictive layers is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the electrical conductivity ranges from 4 to 16 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The high pH and low to

moderate salinity significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 9L.—The soils in this group are moderately deep to very deep and are moderately well drained or well drained. They have a loamy surface layer. The subsoil is loamy or clayey. If the subsoil is clayey, the soil has a loamy surface layer 8 inches or more thick. These soils have less than 35 percent rock fragments by volume throughout. The available water capacity to underlying bedrock or other restrictive layers is more than 3.75 inches but is commonly less than 7.5 inches. In the upper 12 inches of the soil, the electrical conductivity ranges from 4 to 16 millimhos per centimeter. Depth to a water table during the growing season is more than 5 feet.

This group is poorly suited to windbreaks and environmental plantings. The high pH and low to moderate salinity significantly limit the selection and rate of growth of trees and shrubs.

Windbreak suitability group 9W.—The soils in this group are poorly drained to moderately well drained and are moderately deep to very deep. They range from sandy to clayey. In the upper 12 inches of the soil, the electrical conductivity ranges from 4 to 16 millimhos per centimeter. Depth to a water table during the growing season ranges from 1.5 to 5.0 feet.

This group is poorly suited to windbreaks and environmental plantings. The high pH and low to moderate salinity significantly limit the selection and rate of growth of trees and shrubs. Planting may be delayed for a short period in spring because of wetness.

Windbreak suitability group 10.—The soils in this group have one or more characteristics that severely limit the planting and growth of trees and shrubs. For example, the soil depth is shallow; the available water capacity to underlying bedrock or other restrictive layers is less than 2 inches; the calcium carbonate equivalent is more than 40 percent or the electrical conductivity is more than 16 millimhos per centimeter in the upper 12 inches of the soil; or a water table is within 18 inches of the soil surface during the growing season.

This group is generally not recommended for windbreaks and environmental plantings. However, onsite investigations may reveal that some tree and shrub plantings can be made if special treatments are applied. The selection of species should be tailored to the soil conditions at the site.

The windbreak planting zones used in this survey area are described in the following paragraphs. There are no areas of Planting Zone II in the survey area.

Planting Zone I includes areas of soils with a mean annual soil temperature from 47 to 52 degrees F. The average annual air temperature ranges from 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

Planting Zone III includes areas of soils with a mean annual soil temperature of 40 to 47 degrees F, a mean summer soil temperature of less than 59 degrees F, and precipitation of 15 to 19 inches. The average annual air temperature ranges from 40 to 45 degrees F, and the average frost-free period is 90 to 120 days. This zone is characterized by snowpack throughout most of the winter.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 12 and interpretations for septic tank absorption fields in table 13.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of

use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils influence wildlife populations primarily through the kinds of habitat produced. Studies dating back to the 1940's show that wildlife productivity is directly related to soil fertility. The abundant populations of wildlife encountered by early settlers and planners were found on the best soils in a given ecological zone. While it is true that some species of wildlife can be produced on all lands (soils), it also is generally true that wildlife productivity is a function of the biotic potential of the soil. The quantity and quality of most vegetative wildlife habitat elements will not exceed the capability of the soil resource, unless these elements are artificially supplied through intensive management systems.

Most wildlife habitats are created, improved, or maintained by planting suitable vegetation, by manipulating existing vegetation, by inducing natural establishment of desired plants, or by using combinations of such measures. The behavior of soils can be predicted from knowledge of their properties. The growth habits and characteristics of plants that make up wildlife habitat are affected by such behavior. From the appraisal of these vegetative habitat elements, the suitability of a site for various kinds of wildlife can be estimated.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

Information is provided in this survey on the capability of the soils to support irrigated and nonirrigated cultivated crops and native range plants. The survey also includes windbreak and forestry interpretations. Information on the existing and potential plant communities can help the user to select sites for habitat management. The user can determine the intensity of plant community management needed to produce satisfactory results.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the

information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps and soil descriptions and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to

bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and generally 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation

rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers are mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable

material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils; loamy soils that have a relatively high content of clay; soils that have only 20 to 40 inches of suitable material; soils that have an appreciable amount of gravel, stones, or soluble salts; or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey; have less than 20 inches of suitable material; have a large amount of gravel, stones, or soluble salts; have slopes of more than 15 percent; or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers are uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed

channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed (USDA, 1992). During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 15.

Rock fragments larger than 10 inches and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of

clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, 6 to 9 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (up to 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the amount of stable aggregates 0.84 millimeter in size. These are represented idealistically by USDA textural classes. Soils containing rock fragments can occur in any group.

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water

or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table. Only saturated zones within a depth of about 6 feet are indicated.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed

as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning of a dry climate, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (*Argi*, meaning having an argillic horizon, plus *ustoll*, the suborder of the Mollisols that are in a dry climate).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Aridic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Aridic Argiustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999). Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Aberone Series

The Aberone series consists of very deep, well drained soils on terraces and hills and in draws. These soils formed in loamy alluvium and colluvium derived from various sources. Slopes are 3 to 20 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the

average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are loamy-skeletal, carbonatic, mesic Aridic Haplustolls.

Typical pedon of Aberone fine sandy loam, in an area of Treon-Aberone-Treon, thin solum, fine sandy loams, 3 to 30 percent slopes, 1,100 feet north and 2,250 feet west of the southeast corner of sec. 33, T. 17 N., R. 65 W.

A—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; moderately alkaline; clear smooth boundary.

Bw—7 to 16 inches; yellowish brown (10YR 5/4) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; moderately alkaline; clear smooth boundary.

2Bk—16 to 60 inches; light gray (10YR 7/2) very gravelly sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, sticky and plastic; 45 percent gravel, 15 percent cobbles; violently effervescent; calcium carbonate disseminated and occurring as soft masses; 43 percent calcium carbonate equivalent; moderately alkaline.

The mollic epipedon is 8 to 20 inches thick. Some pedons have a layer of gravel on the surface. The depth to horizons containing secondary calcium carbonate or to the 2Bk horizon is 12 to 20 inches. The content of rock fragments in the control section averages from 35 to 60 percent. The rock fragments are dominantly gravel. Calcium carbonate equivalent averages from 40 to 55 percent in the control section. The control section is 5 to 18 percent clay.

Reaction in the A and Bw horizons is slightly alkaline or moderately alkaline. It is moderately alkaline or strongly alkaline in the 2Bk horizon. The Bw horizon is fine sandy loam or sandy loam. The 2Bk horizon is very gravelly loam, very gravelly sandy loam, or extremely gravelly sandy loam. The content of rock fragments in this horizon ranges from 45 to 70 percent.

Albinas Series

The Albinas series consists of very deep, well drained soils on alluvial fans and terraces and in draws. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 6 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are fine-loamy, mixed, mesic Pachic Argiustolls.

Typical pedon of Albinas loam, 0 to 6 percent slopes, 50 feet south and 35 feet east of the northwest corner of sec. 32, T. 14 N., R. 65 W.

A—0 to 3 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; many very fine pores; slightly alkaline; clear smooth boundary.

Bt1—3 to 12 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine pores; many prominent clay films on vertical faces of peds; slightly alkaline; clear smooth boundary.

Bt2—12 to 25 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine pores; many prominent clay films on vertical faces of peds; slightly alkaline; clear smooth boundary.

Bk—25 to 60 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; strongly effervescent; calcium carbonate disseminated and occurring as few soft masses; moderately alkaline.

The mollic epipedon is 20 to 35 inches thick. The depth to horizons containing secondary calcium carbonate is 20 to 35 inches. The control section is 0 to 15 percent gravel. The Bt horizon has hue of 7.5YR or 10YR. It is sandy clay loam or clay loam. Reaction in the A and Bt horizons is neutral or slightly alkaline. It is slightly alkaline or moderately alkaline in the Bk horizon.

Alderon Series

The Alderon series consists of moderately deep, well drained soils on side slopes of foothills and mountain ridges. These soils formed in loamy colluvium and residuum derived from granite. Slopes are 5 to 35 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Typic Eutroboralfs.

Typical pedon of Alderon gravelly sandy loam, in an area of Boyle-Alderon-Cathedral complex, 5 to 45 percent slopes, 500 feet south and 2,200 feet west of the northeast corner of sec. 21, T. 14 N., R. 70 W.

Oi—2 inches to 1 inch; undecomposed forest litter.

Oe—1 inch to 0; decomposed needles, twigs, and bark.

A—0 to 4 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; 15 percent gravel; neutral; clear smooth boundary.

Bt1—4 to 12 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; many very fine roots; few distinct clay films on faces of peds; 10 percent gravel; neutral; clear smooth boundary.

Bt2—12 to 33 inches; brown (7.5YR 5/4) gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; many very fine roots; many distinct clay films on faces of peds; 20 percent gravel; neutral; clear smooth boundary.

Cr—33 inches; semiconsolidated granite.

The depth to granitic bedrock ranges from 20 to 40 inches. The control section is 10 to 35 percent gravel and 20 to 35 percent clay. The surface of the soil is commonly covered with a layer of forest litter. The Bt horizons have hue of 7.5YR or 5YR. Some pedons have a C horizon. This horizon is gravelly sandy loam.

Altvan Series

The Altvan series consists of very deep, well drained soils on hillcrests, ridgetops, terraces, and alluvial fans. These soils formed in loamy over sandy alluvium derived from various sources. Slopes are 0 to 15 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argiustolls.

Typical pedon of Altvan loam, 0 to 6 percent slopes, 1,400 feet south and 100 feet east of the northwest corner of sec. 17, T. 16 N., R. 65 W.

A—0 to 4 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bt1—4 to 8 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate coarse angular blocky structure; hard, firm, sticky and slightly plastic; many very fine roots; few distinct clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bt2—8 to 24 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; hard, firm, sticky and plastic; few very fine roots; many distinct clay films on faces of peds; moderately alkaline; clear smooth boundary.

2Bk—24 to 60 inches; yellowish brown (10YR 5/4) very gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; 55 percent gravel; slightly effervescent; calcium carbonate coatings on rock fragments; calcium carbonate occurring as threads; moderately alkaline.

The mollic epipedon is 7 to 10 inches thick. The depth to horizons containing calcium carbonate is 19 to 36 inches. Calcium carbonate equivalent in the 2Bk horizon ranges from 2 to 10 percent.

The Bt horizon has hue of 10YR or 7.5YR. Reaction is slightly alkaline or moderately alkaline. This horizon is loam, sandy clay loam, or clay loam. Some pedons have a Bk horizon immediately above the 2Bk horizon. The Bk horizon is loam. It is moderately alkaline. The 2Bk horizon is very gravelly sand, gravelly sand, or gravelly coarse sand. It is 30 to 55 percent gravel.

The Altvan soils in map units 102 and 129 are outside the range for the series because they have 35 to 55 percent gravel in the 2Bk horizon.

Ascalon Series

The Ascalon series consists of very deep, well drained soils on alluvial fans and terraces. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 9 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation ranges from 15 to 17 inches, the average annual air temperature is 45 to 50 degrees F, and the average annual frost-free period is 120 to 140 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Ascalon loam, 0 to 6 percent slopes, 700 feet north and 500 feet east of the southwest corner of sec. 6, T. 17 N., R. 65 W.

A—0 to 9 inches; dark brown (10YR 4/3) loam, dark

brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bt1—9 to 23 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; many very fine roots; few distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—23 to 26 inches; dark yellowish brown (10YR 4/4) sandy clay loam, brown (10YR 4/3) moist; moderate coarse angular blocky structure; hard, firm, slightly sticky and slightly plastic; many prominent clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bk—26 to 60 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, slightly sticky and slightly plastic; violently effervescent; calcium carbonate occurring as threads and soft masses; moderately alkaline.

The mollic epipedon is 7 to 10 inches thick. The depth to horizons containing secondary calcium carbonate is 10 to 30 inches. The control section is 0 to 5 percent gravel. The Bt horizon has hue of 10YR or 7.5YR. The A horizon is loam or fine sandy loam. The Bt horizon is sandy clay loam or clay loam. The Bk horizon is loam or sandy loam.

Bayard Series

The Bayard series consists of very deep, well drained soils on terraces and alluvial fans and in draws. These soils formed in loamy alluvium and colluvium derived from sandstone. Slopes are 0 to 15 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed, mesic Torriorthentic Haplustolls.

Typical pedon of Bayard fine sandy loam, 0 to 15 percent slopes, 200 feet west and 2,000 feet south of the northeast corner of sec. 12, T. 17 N., R. 65 W.

A—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

C1—10 to 29 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; strongly effervescent; calcium carbonate disseminated; many very fine roots; slightly alkaline; abrupt wavy boundary.

C2—29 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; strongly effervescent; calcium carbonate disseminated; moderately alkaline.

The mollic epipedon is 8 to 20 inches thick. The depth to horizons containing calcium carbonate is 8 to 20 inches. The control section is 0 to 15 percent gravel.

Reaction in the C2 horizon is slightly alkaline or moderately alkaline. Calcium carbonate equivalent in the C horizon ranges from 2 to 10 percent. The C1 horizon is fine sandy loam or very fine sandy loam. The C2 horizon is fine sandy loam or loamy very fine sand.

The Bayard soil in map unit 105 is a taxadjunct because it has a water table at a depth of 3 to 5 feet from April through July. Also, the control section is stratified with fine sandy loam, very fine sandy loam, or loamy very fine sand. This soil is classified as coarse-loamy, mixed, mesic Oxyaquic Haplustolls.

Blazon Series

The Blazon series consists of very shallow or shallow, well drained soils on hills and ridges. These soils formed in silty alluvium and residuum derived from siltstone, shale, and sandstone. Slopes are 3 to 60 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average annual frost-free period is 90 to 100 days.

These soils are loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents.

Typical pedon of Blazon gravelly silt loam, in an area of Trimad-Weed-Blazon association, 0 to 15 percent slopes, 600 feet north and 1,100 feet west of the southeast corner of sec. 30, T. 17 N., R. 69 W.

A—0 to 2 inches; brown (10YR 5/3) gravelly silt loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, friable, sticky and plastic; 15 percent gravel; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C1—2 to 7 inches; yellowish brown (10YR 5/4) silt loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, firm, sticky and

plastic; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C2—7 to 15 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; violently effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cr—15 inches; semiconsolidated, violently effervescent shale interbedded with sandstone.

In some areas, 15 to 20 percent of the surface is covered with gravel. The depth to bedrock ranges from 4 to 20 inches. These soils are commonly effervescent in all horizons, but some pedons are noneffervescent to a depth of 7 inches. The content of gravel ranges from 0 to 35 percent throughout. The A horizon is loam, silt loam, or gravelly silt loam. The C horizon is loam, silt loam, gravelly silt loam, or clay loam. It has hue of 7.5YR or 10YR.

Boyle Series

The Boyle series consists of shallow or very shallow, well drained soils on mountain ridges and foothills. These soils formed in very gravelly loamy residuum derived from granite, schist, and gneiss. Slopes are 3 to 45 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average annual frost-free period is 90 to 100 days.

These soils are loamy-skeletal, mixed, shallow Aridic Argiborolls.

Typical pedon of Boyle gravelly loam, in an area of Boyle-Rock outcrop-Cathedral complex, 5 to 45 percent slopes, 100 feet south and 2,000 feet east of the northwest corner of sec. 21, T. 14 N., R. 70 W.

A—0 to 7 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; 15 percent gravel; neutral; clear smooth boundary.

Bt1—7 to 13 inches; brown (7.5YR 5/3) very gravelly sandy clay loam, dark brown (7.5YR 4/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; few distinct clay films on faces of peds; 35 percent gravel; neutral; clear smooth boundary.

Bt2—13 to 15 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few distinct clay films on faces of peds; 45 percent gravel; neutral; clear smooth boundary.

Cr—15 inches; semiconsolidated granite.

The mollic epipedon is 7 to 14 inches thick. The depth to bedrock is 10 to 20 inches. The control section averages 35 to 60 percent rock fragments. The rock fragments are dominantly gravel.

The A and Bt2 horizons have hue of 7.5YR or 10YR. The Bt1 horizon has hue of 5YR to 10YR. The A horizon is gravelly loam, very cobbly loam, or very gravelly loam. The Bt horizons are very gravelly loam or very gravelly sandy clay loam.

Some pedons have a C horizon. This horizon is extremely gravelly sand, very gravelly sand, or extremely gravelly coarse sandy loam.

The thin solum Boyle soil in map units 113, 114, 115, and 116 is outside the range for the series because it has bedrock at a depth of 4 to 10 inches.

Breece Series

The Breece series consists of very deep, well drained soils on alluvial fans and in draws. These soils formed in loamy alluvium derived from granite. Slopes are 0 to 10 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average annual frost-free period is 90 to 100 days.

These soils are coarse-loamy, mixed Pachic Haploborolls.

Typical pedon of Breece sandy loam, in an area of Ipson-Breece, dry-Evanston complex, 0 to 6 percent slopes, 1,600 feet east and 1,800 feet north of the southwest corner of sec. 25, T. 16 N., R. 67 W.

A1—0 to 5 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; 10 percent gravel; slightly alkaline; clear smooth boundary.

A2—5 to 25 inches; dark brown (10YR 3/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; 20 percent gravel; slightly alkaline; abrupt wavy boundary.

C—25 to 60 inches; yellowish brown (10YR 5/4) gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; 25 percent gravel; slightly alkaline.

The mollic epipedon is 16 to 30 inches thick. The

control section is 15 to 35 percent rock fragments. The rock fragments are dominantly gravel, but some pedons have 5 percent cobbles. Reaction in the A horizon is neutral or slightly alkaline. The A1 horizon is sandy loam or fine sandy loam. The C horizon is gravelly coarse sandy loam or gravelly sandy loam.

Bresser Series

The Bresser series consists of very deep, well drained soils on terraces. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

The Bresser soils in this survey area are taxadjuncts because they do not have a layer of sandy loam between the B and 2C horizons. These soils are classified as fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argiustolls.

Typical pedon of Bresser sandy loam, 0 to 3 percent slopes, 5 feet north and 5 feet east of the southwest corner of sec. 19, T. 11 N., R. 56 W., in Weld County, Colorado:

A—0 to 15 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; neutral; clear wavy boundary.

Bt1—15 to 19 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common distinct clay films lining interstitial pores; neutral; gradual wavy boundary.

Bt2—19 to 34 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; extremely hard, very firm, sticky and plastic; common fine roots; common distinct clay films on faces of peds and in interstitial pores; neutral; gradual wavy boundary.

BC—34 to 37 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; neutral; gradual wavy boundary.

2C1—37 to 47 inches; grayish brown (10YR 5/2) loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; neutral; clear wavy boundary.

2C2—47 to 60 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; slightly alkaline.

The mollic epipedon is 10 to 20 inches thick. Reaction is slightly acid or neutral in the A horizon. It is neutral or slightly alkaline in the C horizon. The Bt and BC horizons are sandy clay loam or clay loam. The 2C horizon is loamy coarse sand or gravelly loamy sand.

Cantle Series

The Cantle series consists of very deep, poorly drained soils on flood plains. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed (calcareous), frigid Cumulic Endoaquolls.

Typical pedon of Cantle loam, in an area of Cantle-Merden, saline, complex, 0 to 3 percent slopes, 1,500 feet north and 1,600 feet east of the southwest corner of sec. 10, T. 18 N., R. 70 W.

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and nonplastic; many very fine roots; violently effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

A2—10 to 36 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; few medium faint gray (5Y 5/1) redox concentrations; weak fine subangular blocky structure; soft, friable, slightly sticky and nonplastic; few very fine roots; violently effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cg—36 to 60 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; many medium prominent weak red (10R 4/3) redox concentrations; single grain; loose, nonsticky and nonplastic; 30 percent gravel; violently effervescent; calcium carbonate disseminated; moderately alkaline.

The mollic epipedon is 24 to 36 inches thick. Depth to the seasonal high water table is 6 to 18 inches. The A2 horizon is loam or silt loam. The Cg horizon is

gravelly sandy loam, silt loam, or loam. It is 5 to 35 percent fine gravel.

Cathedral Series

The Cathedral series consists of shallow, well drained soils on mountain ridges and foothills. These soils formed in very gravelly loamy residuum and colluvium derived from granite, gneiss, and schist. Slopes are 5 to 45 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 100 days.

These soils are loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of Cathedral gravelly sandy loam, in an area of Cathedral-Boyle complex, 10 to 30 percent slopes, 1,700 feet south and 600 feet west of the northeast corner of sec. 16, T. 14 N., R. 70 W.

A—0 to 7 inches; dark brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; 20 percent gravel; neutral; clear smooth boundary.

C—7 to 13 inches; yellowish brown (10YR 5/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine roots; 75 percent gravel; neutral; abrupt wavy boundary.

R—13 inches; consolidated granite.

The mollic epipedon is 7 to 10 inches thick. In some areas the surface of the soil is covered with a layer of pine needles and twigs. The depth to bedrock ranges from 10 to 20 inches. The control section is 35 to 75 percent rock fragments. The rock fragments are dominantly gravel, but some pedons have 5 percent cobbles. The A horizon is gravelly loam or gravelly sandy loam. The C horizon is very gravelly sandy loam, very channery loam, or extremely gravelly sandy loam. It has hue of 7.5YR or 10YR.

Chalkcreek Family

The Chalkcreek Family consists of very deep, somewhat poorly drained soils on alluvial fans and valley floors and in swales. These soils formed in loamy alluvium derived from red sandstone. Slopes are 0 to 3 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-silty, mixed Borollic Camborthids.

Typical pedon of Chalkcreek Family, 0 to 3 percent slopes, 2,500 feet west and 350 feet south of the northeast corner of sec. 5, T. 18 N., R. 70 W.

A—0 to 6 inches; reddish brown (2.5YR 5/4) loam, reddish brown (2.5YR 4/4) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bw—6 to 30 inches; reddish brown (2.5YR 5/4) silt loam, reddish brown (2.5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bk—30 to 60 inches; light reddish brown (2.5YR 6/4) silt loam, reddish brown (2.5YR 5/4) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; violently effervescent; calcium carbonate occurring as common fine threads; moderately alkaline.

Depth to the seasonal high water table is 3 to 4 feet in April through August. The water table is a result of irrigation in areas of these soils and/or adjacent soils. The depth to horizons containing secondary calcium carbonate is 12 to 25 inches. The control section is 0 to 5 percent gravel. The Bw horizon is slightly alkaline or moderately alkaline. The A and Bw horizons have hue of 2.5YR to 7.5YR. The Bk horizon has hue of 2.5YR or 5YR. The Bw and Bk horizons are silt loam or silty clay loam.

Chalkcreek Series

The Chalkcreek series consists of very deep, well drained soils in swales. These soils formed in loamy alluvium derived from red sandstone. Slopes are 0 to 3 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

The Chalkcreek soils in this survey area have hue redder than 10YR, which is slightly outside the range for the series. This difference does not affect the use or management of the soils. These soils are classified as fine-silty, mixed Borollic Camborthids.

Typical pedon of Chalkcreek loam, in an area of Chalkcreek-Tieside loams, 0 to 6 percent slopes,

1,000 feet west and 2,400 feet south of the northeast corner of sec. 2, T. 15 N., R. 70 W.

A—0 to 6 inches; reddish brown (2.5YR 5/4) loam, reddish brown (2.5YR 4/4) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bw—6 to 23 inches; red (2.5YR 5/6) silt loam, red (2.5YR 4/6) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bk—23 to 60 inches; light reddish brown (2.5YR 6/4) silt loam, reddish brown (2.5YR 5/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; violently effervescent; calcium carbonate occurring as common threads; moderately alkaline.

The depth to horizons containing secondary calcium carbonate is 12 to 25 inches. The control section is 0 to 5 percent gravel. Reaction is slightly alkaline or moderately alkaline throughout the profile. The A and Bw horizons have hue of 2.5YR to 7.5YR. The Bk horizon has hue of 2.5YR or 5YR. The Bw and Bk horizons are silt loam or silty clay loam.

Chaperton Series

The Chaperton series consists of moderately deep, well drained soils on hills and ridges. These soils formed in loamy alluvium and residuum derived from shale and siltstone. Slopes are 3 to 30 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Borollic Camborthids.

Typical pedon of Chaperton loam, in an area of Blazon-Chaperton complex, 3 to 20 percent slopes, 1,000 feet south and 800 feet west of the northeast corner of sec. 36, T. 17 N., R. 70 W.

A—0 to 9 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; hard, friable, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bw—9 to 27 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cr—27 inches; semiconsolidated, slightly effervescent shale.

The depth to semiconsolidated shale is 20 to 40 inches. The control section is 0 to 15 percent gravel. Reaction is slightly alkaline or moderately alkaline throughout the profile. The Bw horizon has hue of 10YR or 2.5Y. It is silty clay loam or clay loam. Some pedons have a Bk horizon. This horizon is clay loam.

Chivington Series

The Chivington series consists of very deep, well drained soils on alluvial fans and terraces and in draws. These soils formed in clayey alluvium derived from various sources. Slopes are 0 to 6 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine, mixed Pachic Argiborolls.

Typical pedon of Chivington loam, 0 to 6 percent slopes, 2,200 feet south and 150 feet west of the northeast corner of sec. 18, T. 15 N., R. 69 W.

A—0 to 3 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine roots; slightly alkaline; clear smooth boundary.

Bt1—3 to 14 inches; dark brown (10YR 3/3) clay, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure; hard, firm, sticky and plastic; common prominent clay films on faces of peds; many fine and very fine roots; slightly alkaline; clear smooth boundary.

Bt2—14 to 29 inches; brown (10YR 4/3) clay, very dark grayish brown (10YR 3/2) moist; strong coarse angular blocky structure; very hard, firm, sticky and plastic; common prominent clay films on faces of peds; few very fine roots; slightly alkaline; clear wavy boundary.

Bk1—29 to 33 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; violently effervescent; calcium carbonate occurring as threads and seams; moderately alkaline; clear smooth boundary.

Bk2—33 to 60 inches; light yellowish brown (10YR

6/4) clay, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, sticky and plastic; violently effervescent; calcium carbonate occurring as soft masses, seams, and threads; moderately alkaline.

The mollic epipedon is 20 to 40 inches thick. The depth to horizons containing secondary calcium carbonate is 15 to 35 inches. The control section is 35 to 60 percent clay. Reaction in the A and Bt horizons is neutral or slightly alkaline. The Bt horizon has hue of 7.5YR or 10YR. It is clay or clay loam. Reaction in the Bk horizon is slightly alkaline or moderately alkaline. This horizon is gravelly clay loam or clay. It is 0 to 25 percent gravel.

Clarkelen Series

The Clarkelen series consists of very deep, moderately well drained soils on flood plains. These soils formed in stratified loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free season is 120 to 140 days.

The Clarkelen soils in this survey area are taxadjuncts because they have a seasonal high water table at a depth of 24 to 60 inches in April through July. These soils are classified as coarse-loamy, mixed (calcareous), mesic Oxyaquic Torrifluvents.

Typical pedon of Clarkelen sandy loam, in an area of Haverdad-Clarkelen-Kovich, warm, complex, 0 to 3 percent slopes, 1,400 feet south and 200 feet west of the northeast corner of sec. 9, T. 17 N., R. 67 W.

A—0 to 8 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, friable, sticky and plastic; many fine and very fine roots; strongly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C1—8 to 18 inches; light brownish gray (10YR 6/2) loamy sand, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C2—18 to 27 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; many very fine roots; 20 percent gravel; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C3—27 to 37 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C4—37 to 60 inches; light brownish gray (10YR 6/2) gravelly sandy loam stratified with thin lenses of sand and very gravelly sand, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine roots; 20 percent gravel; slightly effervescent; calcium carbonate disseminated; moderately alkaline.

The control section averages 0 to 15 percent rock fragments and 5 to 15 percent clay. In some pedons, the content of rock fragments averages 35 to 50 percent in the horizons below a depth of 40 inches.

Cowestglen Series

The Cowestglen series consists of very deep, well drained soils on flood plains. These soils formed in stratified loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents.

Typical pedon of Cowestglen fine sandy loam, 0 to 3 percent slopes, 600 feet east and 100 feet south of the northwest corner of sec. 4, T. 19 N., R. 68 W.

A—0 to 7 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate thin platy structure; soft, friable, nonsticky and nonplastic; many fine and very fine roots; slightly effervescent; calcium carbonate disseminated; slightly alkaline; abrupt wavy boundary.

C1—7 to 54 inches; brown (10YR 5/3) coarse sandy loam stratified with thin lenses of silty clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; strongly effervescent; calcium carbonate disseminated; moderately alkaline; gradual wavy boundary.

C2—54 to 60 inches; dark grayish brown (10YR 4/2) sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; strongly effervescent; calcium carbonate disseminated; moderately alkaline.

The control section is 0 to 15 percent gravel and 12 to 18 percent clay. Reaction is slightly alkaline or

moderately alkaline throughout the profile. The C1 horizon has a dominant texture of sandy loam or coarse sandy loam, but a few thin strata of loam, sandy clay loam, silt loam, silty clay loam, or clay loam are present in most pedons. The C2 horizon has a dominant texture of sandy loam, but thin strata of silt loam, clay loam, loamy fine sand, and loamy sand are present in most pedons.

Dalecreek Series

The Dalecreek series consists of very deep, moderately well drained soils on flood plains. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 9 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Cumulic Haploborolls.

Typical pedon of Dalecreek loam, in an area of Dalecreek-Kovich, cool, loams, 0 to 9 percent slopes, 1,800 feet south and 2,250 feet west of the northeast corner of sec. 30, T. 17 N., R. 70 W.

A—0 to 10 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

C—10 to 37 inches; very dark gray (10YR 3/1) gravelly sandy clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; 15 percent gravel; slightly alkaline.

Cg—37 to 60 inches; very dark gray (10YR 3/1) gravelly sandy clay loam, black (10YR 2/1) moist; few fine faint gray (10YR 5/1) mottles; weak fine subangular blocky structure; hard, firm, sticky and plastic; 15 percent gravel; slightly alkaline.

The mollic epipedon is 24 to 60 inches thick. Depth to the seasonal high water table is 36 to 48 inches in April through July. The average content of rock fragments in the control section ranges from 15 to 20 percent. The rock fragments are dominantly gravel. The control section is 18 to 35 percent clay. Reaction throughout the profile is neutral or slightly alkaline. The Bw horizon, if it occurs, has hue of 10YR or 7.5YR, value of 3 to 5 dry and 2 or 3 moist, and chroma of 1 to 3. The texture typically is loam, very fine sandy loam, fine sandy loam, or sandy clay loam with 18 to 25 percent clay. The C horizon has a dominant texture of gravelly sandy clay loam, but it has thin lenses of fine sandy loam, sandy loam, and loamy coarse sand in many pedons.

Dix Series

The Dix series consists of very deep, excessively drained soils on terraces and hills. These soils formed in extremely gravelly sandy alluvium derived from various sources. Slopes are 6 to 30 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are sandy-skeletal, mixed, mesic Torriorthentic Haplustolls.

Typical pedon of Dix gravelly loam (fig. 5), in an area of Dix-Altvan complex, 10 to 30 percent slopes, 50 feet south and 700 feet west of the northeast corner of sec. 5, T. 12 N., R. 65 W.

A—0 to 10 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; 20 percent fine gravel; slightly alkaline; clear smooth boundary.

2C1—10 to 15 inches; yellowish brown (10YR 5/4) extremely gravelly sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 60 percent gravel, 5 percent cobbles; moderately alkaline; clear smooth boundary.

2C2—15 to 60 inches; yellowish brown (10YR 5/4) extremely gravelly coarse sand, yellowish brown (10YR 5/4) moist; single grain; 65 percent gravel, 20 percent cobbles; moderately alkaline.

The mollic epipedon is 7 to 13 inches thick. Depth to the 2C horizon is 10 to 20 inches. The control section is 35 to 85 percent rock fragments. It averages 2 to 10 percent clay. The 2C1 horizon is very gravelly sand, extremely gravelly sand, or very gravelly sandy loam. The 2C2 horizon is extremely gravelly coarse sand, extremely gravelly sand, or very gravelly sand.

Embry Series

The Embry series consists of very deep, well drained soils on hills, terraces, and alluvial fans. These soils formed in loamy alluvium and eolian deposits derived from sandstone. Slopes are 2 to 10 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free season is 120 to 140 days.

The Embry soils in this survey area are slightly effervescent above a depth of 40 inches. This characteristic is outside the range for the series. These soils are classified as coarse-loamy, mixed, nonacid, mesic Ustic Torriorthents.

Typical pedon of Embry loamy fine sand, 2 to 10 percent slopes, 200 feet south and 200 feet west of the northeast corner of sec. 1, T. 19 N., R. 66 W.

A—0 to 10 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; slightly alkaline; clear smooth boundary.

C1—10 to 27 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, friable, nonsticky and nonplastic; slightly alkaline; clear smooth boundary.

C2—27 to 60 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; slightly effervescent; calcium carbonate disseminated; moderately alkaline.

The depth to horizons containing calcium carbonate ranges from 25 to 40 inches. The control section is 0 to 15 percent gravel. The texture in the control section is fine sandy loam or sandy loam. Reaction in the A and C1 horizons is neutral or slightly alkaline. Reaction in the C2 horizon is slightly alkaline or moderately alkaline.

Evanston Series

The Evanston series consists of very deep, well drained soils on terraces, alluvial fans, and hills. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 35 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Aridic Argiborolls.

Typical pedon of Evanston loam, 0 to 6 percent slopes, 1,700 feet north and 2,000 feet west of the southeast corner of sec. 6, T. 14 N., R. 67 W.

A—0 to 3 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bt1—3 to 12 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; hard, firm, sticky and plastic; many distinct clay films on faces of peds; many very fine roots; slightly alkaline; clear smooth boundary.

Bt2—12 to 15 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; many distinct clay films on faces of peds; many very fine roots; slightly alkaline; clear smooth boundary.

Btk—15 to 18 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; very hard, very firm, sticky and plastic; many very fine roots; few distinct clay films on faces of peds; slightly effervescent; calcium carbonate occurring as threads; moderately alkaline; clear wavy boundary.

Bk1—18 to 26 inches; very pale brown (10YR 7/3) loam, light yellowish brown (10YR 6/4) moist; massive; hard, firm, sticky and plastic; violently effervescent; calcium carbonate occurring as threads; moderately alkaline; clear smooth boundary.

Bk2—26 to 60 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; violently effervescent; calcium carbonate disseminated; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. The depth to horizons containing secondary calcium carbonate is 12 to 28 inches. Hue is 10YR or 7.5YR throughout the profile. The A horizon is loam or gravelly sandy loam. It is neutral or slightly alkaline. The Bt horizons are loam, sandy clay loam, clay loam, or gravelly clay loam. The Bk horizons are gravelly sandy loam, gravelly sandy clay loam, loam, or sandy clay loam. The Bt and Bk horizons are 0 to 20 percent gravel. Reaction in the Bk horizon is slightly alkaline or moderately alkaline.

Haverdad Series

The Haverdad series consists of very deep, well drained soils on flood plains. These soils formed in stratified alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

The Haverdad soils in this survey area are taxadjuncts because they have a 2C horizon of very gravelly sand. These soils are classified as fine-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of Haverdad sandy clay loam, in an

area of Haverdad-Clarkelen-Kovich, warm, complex, 0 to 3 percent slopes, 2,250 feet south and 950 feet west of the northeast corner of sec. 6, T. 17 N., R. 66 W.

A—0 to 7 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, firm, sticky and plastic; many fine and very fine roots; strongly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C1—7 to 30 inches; light brownish gray (10YR 6/2) sandy clay loam stratified with thin lenses of sandy loam and loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, slightly firm, slightly sticky and slightly plastic; many very fine roots; violently effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

2C2—30 to 60 inches; light brownish gray (10YR 6/2) very gravelly sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; 50 percent gravel; strongly effervescent; calcium carbonate disseminated; moderately alkaline.

Depth to the 2C horizon is 15 to 40 inches. The C1 horizon has a dominant texture of sandy clay loam, but it has thin strata of loamy sand, sandy loam, or loam in most pedons.

Haverson Series

The Haverson series consists of very deep, well drained soils on flood plains and adjacent low terraces. These soils formed in stratified loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of Haverson loam, 0 to 3 percent slopes, 1,320 feet south and 1,320 feet east of the northwest corner of sec. 36, T. 10 N., R. 64 W., in Weld County, Colorado:

A1—0 to 3 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; strong fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; violently effervescent; slightly alkaline; clear smooth boundary.

A2—3 to 6 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; hard, friable, nonsticky and nonplastic; many fine roots; strongly effervescent; slightly alkaline; abrupt smooth boundary.

A3—6 to 12 inches; light grayish brown (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; very hard, friable, nonsticky and nonplastic; many fine roots; strongly effervescent; slightly alkaline; clear smooth boundary.

C1—12 to 32 inches; pale brown (10YR 6/3) very fine sandy loam with thin lenses of loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; strongly effervescent; slightly alkaline; gradual smooth boundary.

C2—32 to 60 inches; pale brown (10YR 6/3) loam with thin lenses of sandy loam and very fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent; calcium carbonate occurring as few faint irregularly shaped soft masses and seams; moderately alkaline.

The depth to horizons containing calcium carbonate ranges from 0 to 5 inches. The particle-size control section is stratified and is dominantly loam or very fine sandy loam. Thin lenses of sandy loam, fine sand, or silt occur in most pedons. Some pedons have thin strata of clay loam. The particle-size control section averages 18 to 35 percent clay and 15 to 35 percent fine sand or coarser sand. Reaction is slightly alkaline or moderately alkaline throughout the profile.

Ipson Series

The Ipson series consists of very deep, well drained soils on knolls, hills, ridges, and alluvial fans. These soils formed in very gravelly loamy alluvium derived from various sources. Slopes are 0 to 45 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are loamy-skeletal, mixed Aridic Argiborolls.

Typical pedon of Ipson gravelly loam, in an area of Ipson-Evanston complex, 6 to 30 percent slopes, 800 feet north and 1,200 feet east of the southwest corner of sec. 15, T. 14 N., R. 69 W.

A—0 to 8 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; 15 percent gravel; slightly alkaline; clear smooth boundary.

Bt—8 to 14 inches; brown (7.5YR 5/3) very gravelly

sandy clay loam, dark brown (7.5YR 4/3) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; many very fine roots; few distinct clay films on faces of peds; 35 percent gravel; slightly alkaline; clear smooth boundary.

Bk—14 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, friable, slightly sticky and slightly plastic; 35 percent gravel; violently effervescent; calcium carbonate occurring as seams and as coatings on gravel; moderately alkaline.

The mollic epipedon is 7 to 10 inches thick. The control section is 35 to 50 percent rock fragments. The depth to horizons containing secondary calcium carbonate is 10 to 26 inches. The A horizon is loam or gravelly loam. It is neutral or slightly alkaline.

The Bt horizon has hue of 10YR or 7.5YR. It is very gravelly sandy clay loam or very gravelly loam. Reaction is slightly alkaline or moderately alkaline in this horizon. The Bk horizon is very gravelly sandy loam, very gravelly sandy clay loam, or very gravelly loam.

Kovich Series

The Kovich series consists of very deep, poorly drained soils on flood plains. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 9 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

The Kovich soils in this survey area have texture of gravelly sandy clay loam or gravelly loam in the 2C horizon to a depth of 60 inches. This characteristic is outside the range for the series. These soils are classified as fine-loamy, mixed, frigid Cumulic Endoaquolls. In addition, the Kovich soil in map unit 135 has a warmer soil temperature than is defined as the range for the series. This soil is classified as a fine-loamy, mixed, mesic Cumulic Endoaquoll.

Typical pedon of Kovich loam, in an area of Merden, cool-Kovich complex, 0 to 3 percent slopes, 900 feet north and 2,000 feet west of the southeast corner of sec. 25, T. 17 N., R. 70 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; neutral; abrupt wavy boundary.

Bg—4 to 24 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; few medium faint dark yellowish brown (10YR 4/4) redox concentrations; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

2Cg—24 to 60 inches; dark brown (10YR 4/3) gravelly sandy clay loam, black (10YR 2/1) moist; few medium faint dark yellowish brown (10YR 4/4) redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; 20 percent gravel; neutral.

The mollic epipedon is 24 to 60 inches thick. Depth to the seasonal high water table ranges from 6 to 18 inches in April through July. Depth to the 2C horizon is 24 to 38 inches. Reaction is neutral or slightly alkaline throughout the profile. The 2C horizon is gravelly sandy clay loam or gravelly loam. It is 15 to 25 percent gravel.

The Bg and Cg horizons in map unit 135 have a dominant texture of loam or silt loam, but strata of fine sandy loam or sandy clay loam are present in most pedons. The depth to horizons containing calcium carbonate ranges from 0 to 11 inches.

Lininger Series

The Lininger series consists of moderately deep, well drained soils on mountain ridges and foothills. These soils formed in loamy alluvium and colluvium derived from granite, schist, and gneiss. Slopes are 1 to 35 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Typic Argiborolls.

Typical pedon of Lininger loam, in an area of Boyle-Lininger association, 1 to 15 percent slopes, 400 feet north and 300 feet west of the southeast corner of sec. 22, T. 14 N., R. 70 W.

A—0 to 4 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

BA—4 to 8 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; neutral; abrupt wavy boundary.

Bt1—8 to 15 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate

coarse angular blocky structure; hard, firm, slightly sticky and slightly plastic; few distinct clay films on faces of peds; neutral; abrupt wavy boundary.

Bt2—15 to 25 inches; brown (7.5YR 5/4) gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; common distinct clay films on faces of peds; 20 percent gravel; slightly alkaline; clear smooth boundary.

Cr—25 inches; semiconsolidated granite.

The mollic epipedon is 7 to 13 inches thick. The depth to semiconsolidated granite bedrock is 20 to 40 inches. The control section is 18 to 35 percent clay. Reaction is neutral or slightly alkaline throughout the profile. Hue is 7.5YR or 10YR. The Bt1 horizon is sandy clay loam or loam. It is 0 to 15 percent rock fragments. The Bt2 horizon is 15 to 20 percent rock fragments. The rock fragments are dominantly gravel.

Manter Series

The Manter series consists of very deep, well drained soils on alluvial fans, terraces, hills, and knolls of plains and uplands. These soils formed in loamy alluvium and eolian deposits derived from sandstone. Slopes are 0 to 30 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Manter sandy loam, 0 to 6 percent slopes, 1,000 feet south and 50 feet east of the northwest corner of sec. 8, T. 18 N., R. 65 W.

A—0 to 7 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; slightly alkaline; clear smooth boundary.

Bt—7 to 19 inches; brown (10YR 5/3) loam, dark brown (7.5YR 4/3) moist; moderate coarse prismatic structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; few distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Btk—19 to 23 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few distinct clay films on faces of peds; slightly effervescent; calcium carbonate occurring as seams; slightly alkaline; clear smooth boundary.

Bk—23 to 60 inches; very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; violently effervescent; calcium carbonate occurring as seams and soft masses; moderately alkaline.

The mollic epipedon is 7 to 19 inches thick. The depth to horizons containing secondary calcium carbonate is 12 to 40 inches (fig. 6). The A and Bk horizons are sandy loam or fine sandy loam. The Bt horizon has hue of 10YR or 7.5YR. It is fine sandy loam, sandy loam, or loam. The Bk horizon is slightly alkaline or moderately alkaline.

Merden Series

The Merden series consists of very deep, poorly drained soils on flood plains. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

The Merden soils are fine-loamy, mixed (calcareous), mesic Fluvaquentic Endoaquolls.

Typical pedon of Merden silty clay loam, in an area of Urban land-Merden complex, 0 to 3 percent slopes, 2,100 feet south and 2,500 feet east of the northwest corner of sec. 4, T. 13 N., R. 66 W.

A—0 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, very dark brown (10YR 2/2) moist; weak fine granular structure; very hard, very firm, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bg—12 to 24 inches; white (10YR 8/2) silty clay loam, grayish brown (10YR 5/2) moist; many medium distinct dark yellowish brown (10YR 4/4) redox concentrations; weak fine subangular blocky structure; very firm, very hard, sticky and plastic; violently effervescent; calcium carbonate disseminated; strongly alkaline; clear smooth boundary.

Cg—24 to 60 inches; white (10YR 8/2) silty clay loam, light brownish gray (10YR 6/2) moist; many medium distinct dark yellowish brown (10YR 4/4) redox concentrations; massive; very hard, firm, sticky and plastic; violently effervescent; calcium carbonate disseminated; strongly alkaline.

The mollic epipedon is 10 to 20 inches thick. The average clay content in the control section ranges

from 27 to 35 percent. In most pedons reaction is moderately alkaline or strongly alkaline throughout the profile, but in some pedons it is mildly alkaline. In most pedons electrical conductivity ranges from 4 to 8 millimhos per centimeter throughout, but in some pedons it is less than 2 millimhos per centimeter. The Bg and Cg horizons have hue of 10YR to 5Y. The Bg horizon is clay loam or silty clay loam.

The Merden soils in map units 122 and 146 are taxadjuncts because they have a colder soil temperature than is defined as the range for the series and are slightly more silty. These soils are classified as fine-silty, mixed (calcareous), frigid Fluvaquentic Endoaquolls.

Mitchell Series

The Mitchell series consists of very deep, well drained soils on alluvial fans, hills, and terraces of plains and uplands. These soils formed in silty alluvium derived from siltstone. Slopes are 0 to 6 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-silty, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Mitchell silt loam, 0 to 6 percent slopes, 2,500 feet east and 1,500 feet south of the northwest corner of sec. 5, T. 19 N., R. 66 W.

A—0 to 6 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; strongly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

C1—6 to 44 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; strongly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

C2—44 to 60 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; massive; hard, friable, sticky and plastic; violently effervescent; calcium carbonate disseminated; slightly alkaline.

These soils are commonly effervescent in all horizons, but some pedons are noneffervescent to a depth of 10 inches. The control section is 0 to 15 percent gravel.

Moskee Series

The Moskee series consists of very deep, well drained soils on alluvial fans and terraces and in draws. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Moskee fine sandy loam, 0 to 3 percent slopes, 1,000 feet west and 700 feet north of the southeast corner of sec. 8, T. 19 N., R. 65 W.

A—0 to 7 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

Bt—7 to 16 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many fine and very fine roots; many distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Btk—16 to 22 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; violently effervescent; calcium carbonate disseminated and occurring as few fine threads; moderately alkaline; gradual wavy boundary.

Bk—22 to 60 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, friable, sticky and plastic; violently effervescent; calcium carbonate disseminated and occurring as common fine threads; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. The control section is 0 to 15 percent gravel. The depth to horizons containing secondary calcium carbonate is 12 to 30 inches. The Bt horizon has hue of 10YR or 7.5YR. It is slightly alkaline or moderately alkaline. The Bk horizon is sandy loam, fine sandy loam, or sandy clay loam.

Nucla Series

The Nucla series consists of very deep, well drained soils on alluvial fans and terraces. These soils formed in loamy alluvium derived from various

sources. Slopes are 0 to 3 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are fine-loamy, mixed, mesic Torriorthentic Haplustolls.

Typical pedon of Nucla loam, 0 to 3 percent slopes, 2,000 feet north and 2,350 feet east of the southwest corner of sec. 9, T. 14 N., R. 67 W.

A—0 to 7 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many medium roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bw—7 to 16 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bk1—16 to 28 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; violently effervescent; calcium carbonate disseminated and occurring as soft masses; moderately alkaline; clear smooth boundary.

Bk2—28 to 60 inches; very pale brown (10YR 8/4) fine sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; violently effervescent; calcium carbonate occurring as soft masses; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. The depth to horizons containing secondary calcium carbonate ranges from 10 to 20 inches. The control section is 0 to 15 percent gravel and 18 to 25 percent clay. The A horizon is slightly alkaline or moderately alkaline.

Otero Series

The Otero series consists of very deep, well drained soils on terraces, alluvial fans, hills, and knolls. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 15 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Otero fine sandy loam, 0 to 6 percent slopes, 1,200 feet west and 1,000 feet north of the southeast corner of sec. 13, T. 18 N., R. 67 W.

A—0 to 7 inches; yellowish brown (10YR 5/4) fine sandy loam, brown (10YR 5/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

C—7 to 60 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; few fine roots; violently effervescent; calcium carbonate disseminated; slightly alkaline.

These soils are commonly effervescent in all horizons, but some pedons are noneffervescent to a depth of 10 inches. The control section is 12 to 18 percent clay. In some pedons the C horizon is loamy fine sand below a depth of 30 inches. The C horizon is slightly alkaline or moderately alkaline.

Paoli Series

The Paoli series consists of very deep, well drained soils on alluvial fans, in draws, and on terraces. These soils formed in loamy alluvium derived from sandstone. Slopes are 0 to 9 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed, mesic Pachic Haplustolls.

Typical pedon of Paoli fine sandy loam, 0 to 3 percent slopes, 1,500 feet south and 900 feet west of the northeast corner of sec. 7, T. 18 N., R. 66 W.

A1—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

A2—10 to 18 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.

ABk—18 to 23 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable,

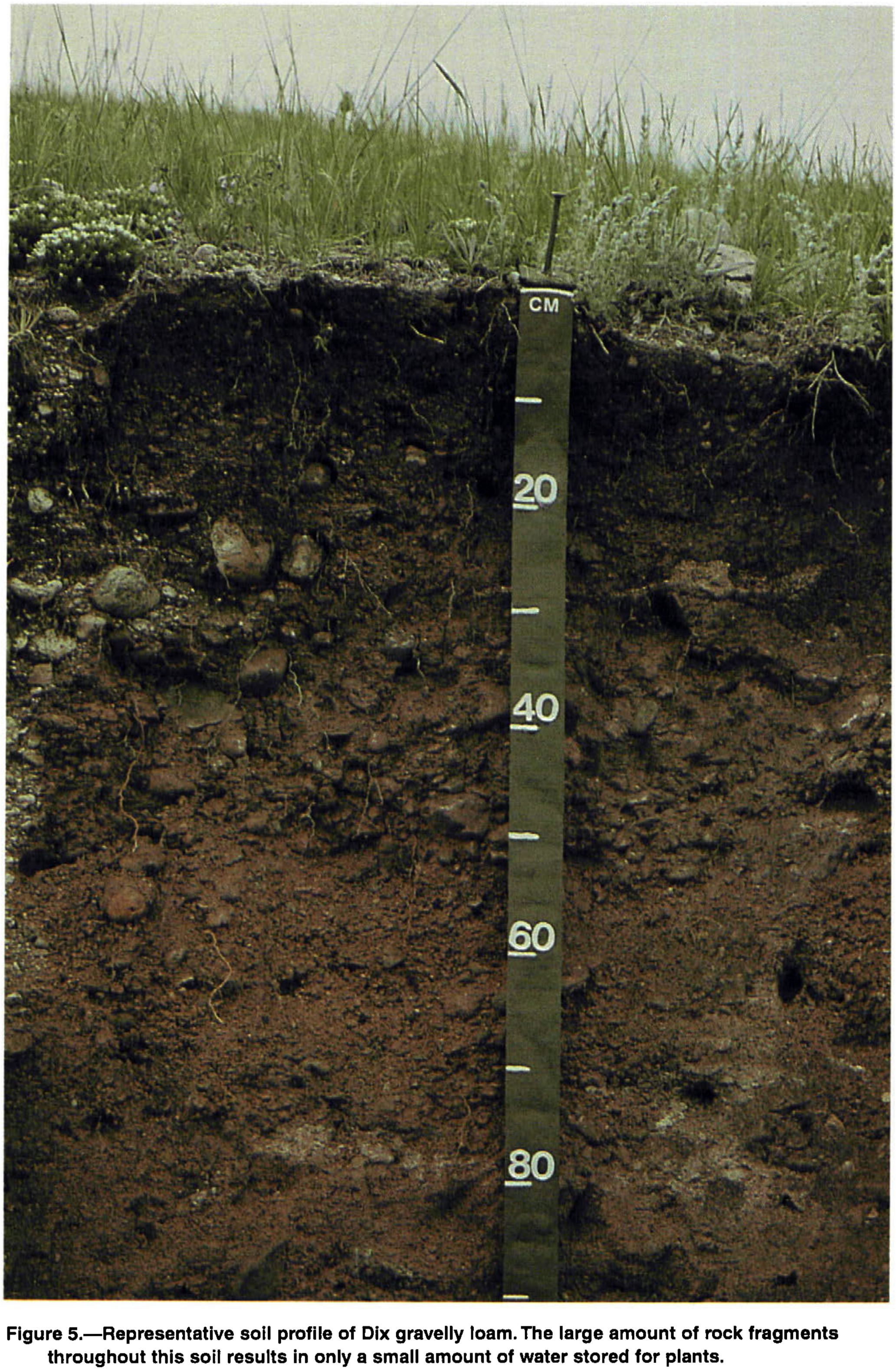


Figure 5.—Representative soil profile of Dix gravelly loam. The large amount of rock fragments throughout this soil results in only a small amount of water stored for plants.

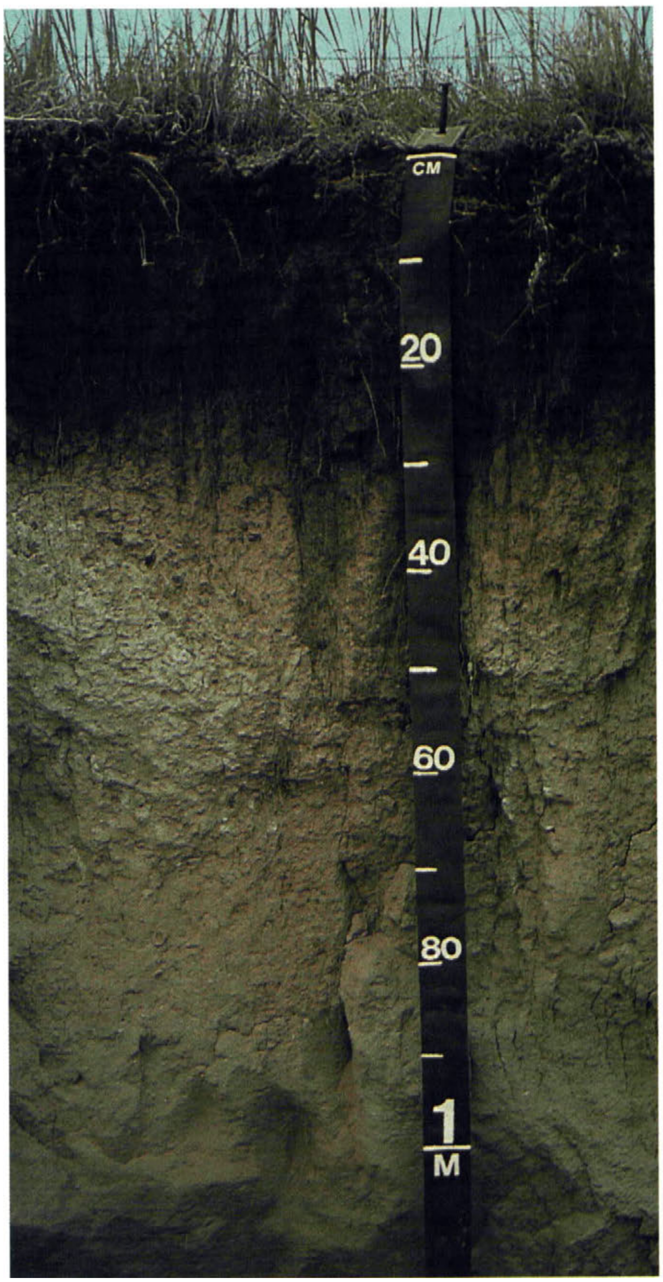


Figure 6.—Representative soil profile of Manter sandy loam. The horizons below a depth of 33 centimeters (12 inches) contain calcium carbonate.

Figure 7.—Representative soil profile of Treon fine sandy loam. Sandstone bedrock is at a depth of 26 centimeters (10 inches).

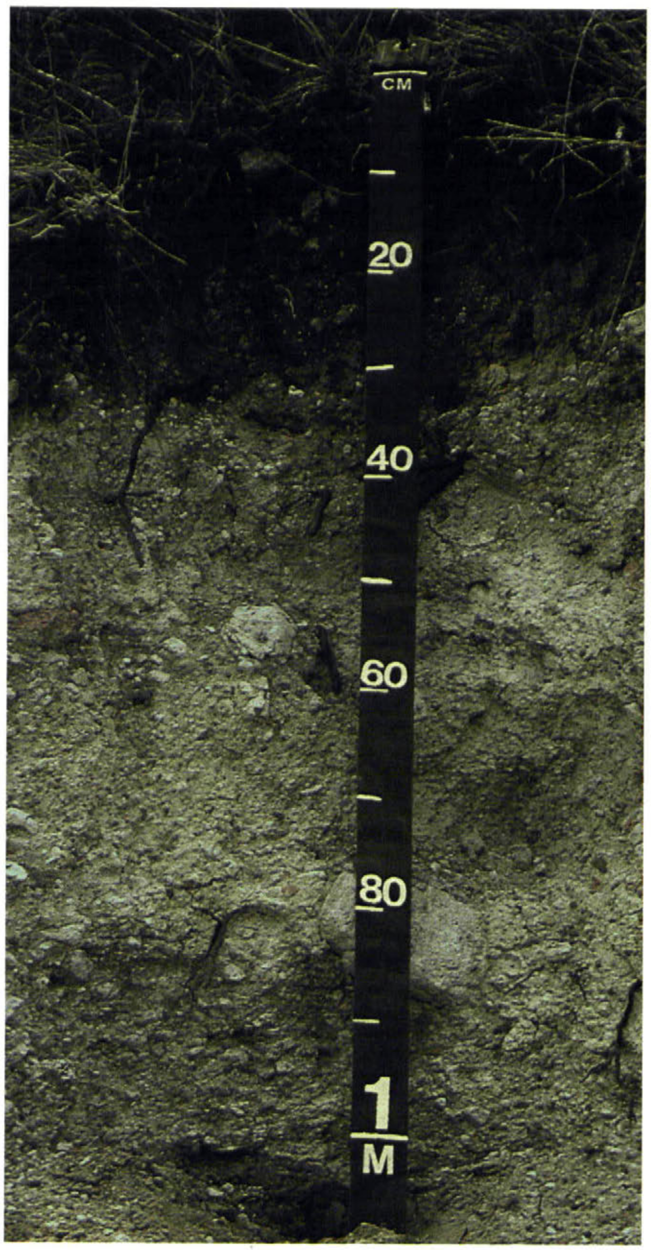


Figure 8.—Representative soil profile of Trimad gravelly loam. A large amount of calcium carbonate occurs in the horizons below a depth of 35 centimeters.

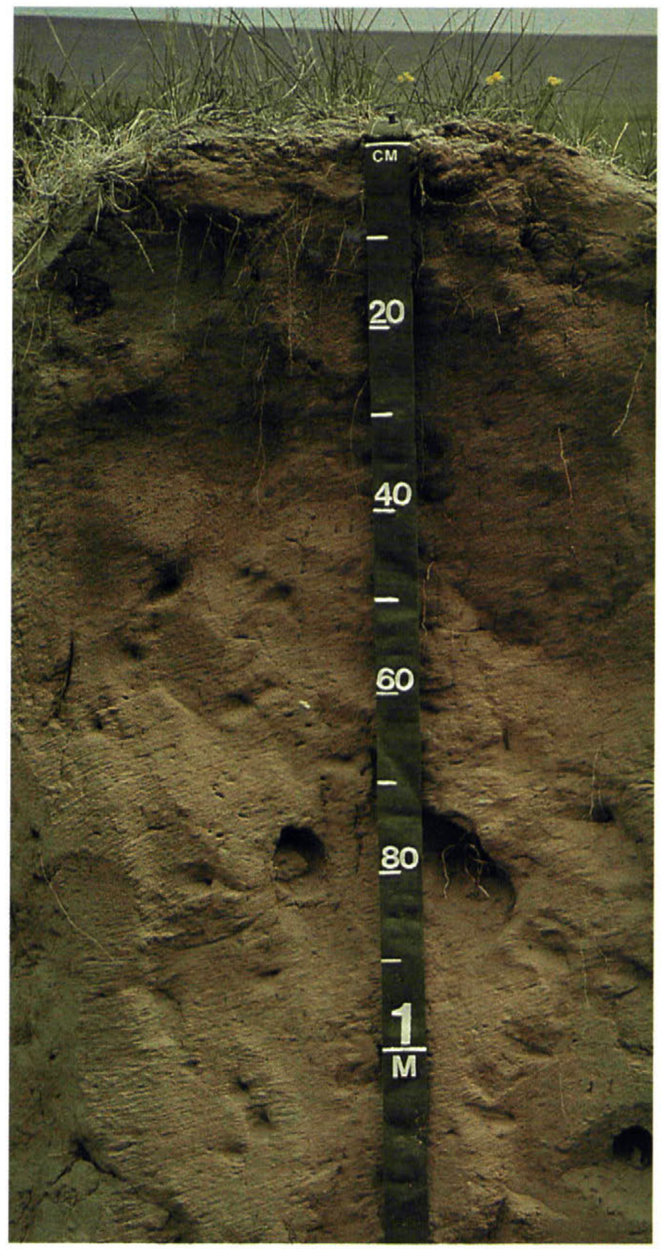


Figure 9.—Representative soil profile of Valent loamy fine sand. No diagnostic horizons are present in this young soil.

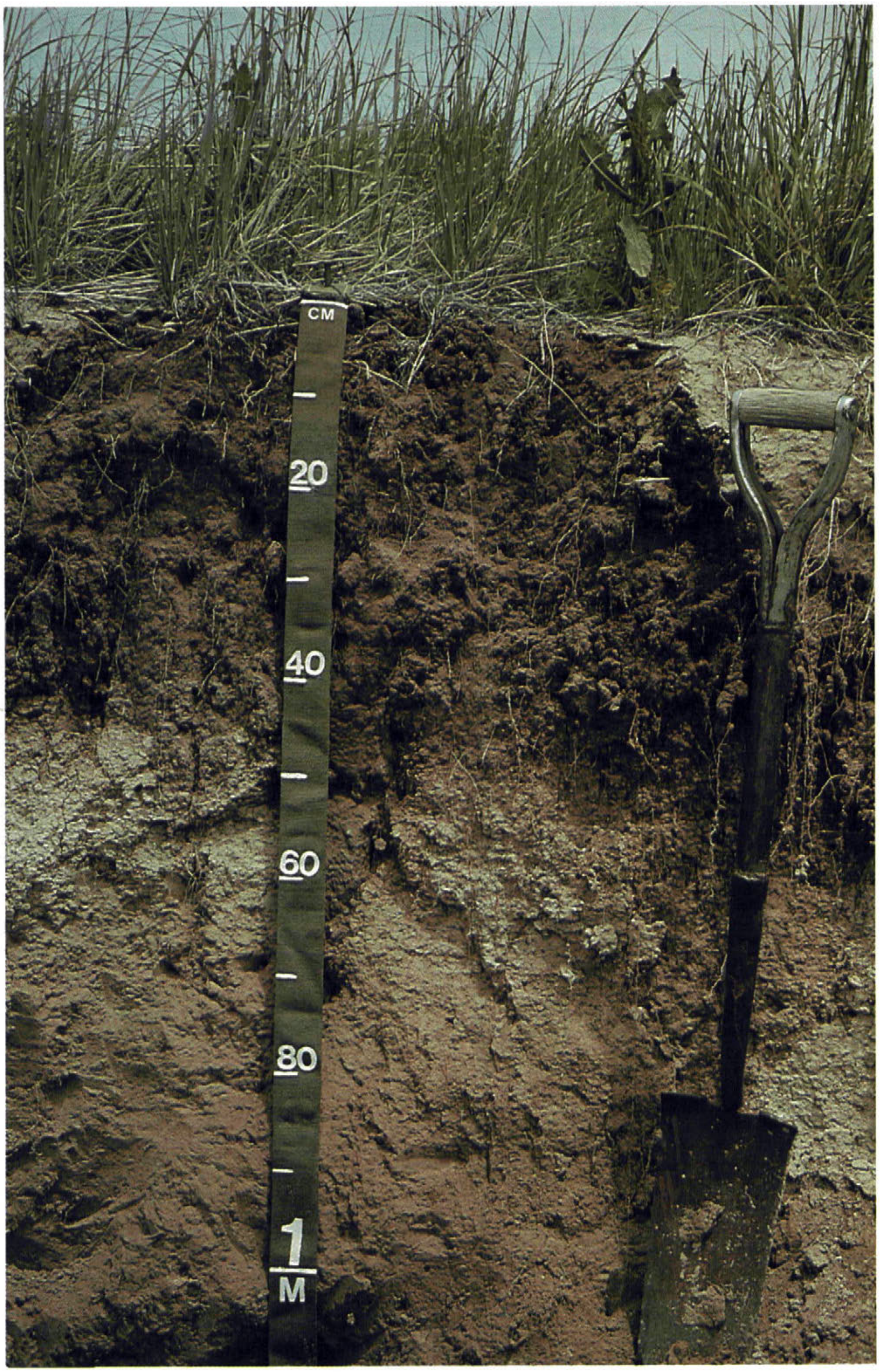


Figure 10.—Representative soil profile of Vonalee fine sandy loam. The argillic horizon is between depths of 12 centimeters (5 inches) and 46 centimeters (18 inches). The horizons below a depth of 46 centimeters (18 inches) contain calcium carbonate.

nonsticky and nonplastic; slightly effervescent; calcium carbonate occurring as threads; moderately alkaline; clear smooth boundary.

Bk—23 to 60 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; violently effervescent; calcium carbonate occurring as threads and soft masses; moderately alkaline.

The mollic epipedon is 20 to 35 inches thick. The depth to horizons containing secondary calcium carbonate is 10 to 25 inches. The control section is 10 to 18 percent clay. The Bk horizon is sandy loam or fine sandy loam.

Peetz Series

The Peetz series consists of very deep, somewhat excessively drained soils on ridges, breaks, and hills. These soils formed in gravelly alluvium derived from various sources. Slopes are 5 to 20 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are sandy-skeletal, mixed, mesic Aridic Calciustolls.

Typical pedon of Peetz gravelly sandy loam, 5 to 20 percent slopes, 600 feet west and 2,540 feet north of the southeast corner of sec. 6, T. 11 N., R. 62 W., in Weld County, Colorado:

A1—0 to 4 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; 20 percent gravel; slightly alkaline; clear smooth boundary.

A2—4 to 8 inches; brown (10YR 5/3) very gravelly loamy sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; 35 percent gravel; slightly alkaline; clear smooth boundary.

Bk—8 to 20 inches; pale brown (10YR 6/3) very gravelly sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 40 percent gravel; violently effervescent; calcium carbonate occurring as common faint round soft masses and concretions; moderately alkaline; clear smooth boundary.

C1—20 to 36 inches; very pale brown (10YR 7/3) very gravelly sand, pale brown (10YR 6/3) moist; single grain; loose, nonsticky and nonplastic; 40 percent gravel; strongly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C2—36 to 60 inches; very pale brown (10YR 7/4) gravelly sand, light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky and nonplastic; 30 percent gravel; strongly effervescent; calcium carbonate disseminated; moderately alkaline.

The mollic epipedon is 7 to 15 inches thick. The depth to horizons containing secondary calcium carbonate is 5 to 15 inches. The particle-size control section is 35 to 65 percent gravel. The A horizon is 15 to 35 percent gravel. Reaction is neutral or slightly alkaline in the A horizon and slightly alkaline or moderately alkaline in the Bk and C horizons. The Bk and C horizons are very gravelly sand or very gravelly loamy sand. Calcium carbonate equivalent is 10 to 20 percent in the Bk horizon and 5 to 20 percent in the C horizon.

Piezon Series

The Piezon series consists of moderately deep, well drained soils on hills and knolls. These soils formed in silty residuum and colluvium derived from siltstone. Slopes are 3 to 6 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Borollic Calciorthids.

Typical pedon of Piezon silt loam, in an area of Poposhia-Piezon silt loams, 0 to 6 percent slopes, 200 feet south and 250 feet west of the northeast corner of sec. 22, T. 15 N., R. 69 W.

A—0 to 4 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, friable, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bk1—4 to 13 inches; light yellowish brown (10YR 6/4) silt loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; slightly effervescent; calcium carbonate occurring as threads and soft masses; moderately alkaline; clear smooth boundary.

Bk2—13 to 23 inches; light yellowish brown (10YR 6/4) silt loam, yellowish brown (10YR 5/4) moist;

massive; slightly hard, friable, sticky and plastic; violently effervescent; 23 percent calcium carbonate equivalent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cr—23 inches; semiconsolidated, violently effervescent, gray siltstone.

The depth to siltstone bedrock is 20 to 40 inches. The average clay content in the control section ranges from 18 to 25 percent. The A horizon is slightly alkaline or moderately alkaline. The Bk horizons have hue of 7.5YR or 10YR. Calcium carbonate equivalent in the Bk horizon is 15 to 25 percent.

Pinelli Series

The Pinelli series consists of very deep, well drained soils on hillslopes and alluvial fans and in draws. These soils formed in clayey alluvium derived from various sources. Slopes are 3 to 15 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine, montmorillonitic Borollic Haplargids.

Typical pedon of Pinelli clay loam, in an area of Pinelli-Chivington complex, 0 to 15 percent slopes, 800 feet north and 2,200 feet east of the southwest corner of sec. 10, T. 14 N., R. 69 W.

A—0 to 4 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; 10 percent gravel; slightly alkaline; clear smooth boundary.

Bt1—4 to 9 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; many very fine roots; many distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—9 to 23 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; many distinct clay films on faces of peds; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bk—23 to 60 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; massive; hard, friable, sticky and plastic; violently effervescent; calcium carbonate occurring as soft masses; moderately alkaline.

The depth to horizons containing secondary calcium carbonate is 6 to 30 inches. The A horizon has hue of 7.5YR or 10YR. This horizon is neutral or slightly alkaline. It is loam or clay loam. The Bt horizon is clay or clay loam. The Bk horizon is sandy clay loam or clay loam.

Poposhia Series

The Poposhia series consists of very deep, well drained soils on valley floors, alluvial fans, hills, and knolls and in draws. These soils formed in silty alluvium and residuum derived from siltstone. Slopes are 0 to 15 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of Poposhia silt loam, in an area of Blazon-Blazon, thin solum-Poposhia silt loams, 0 to 6 percent slopes, 1,200 feet north and 1,700 feet east of the southwest corner of sec. 26, T. 15 N., R. 69 W.

A—0 to 6 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, friable, sticky and plastic; many very fine roots; strongly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bk—6 to 18 inches; very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; soft, friable, sticky and plastic; many very fine roots; strongly effervescent; calcium carbonate disseminated and occurring as few fine threads and seams; moderately alkaline; clear smooth boundary.

C1—18 to 44 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; strongly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C2—44 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, sticky and plastic; violently effervescent; calcium carbonate disseminated; moderately alkaline.

These soils are commonly effervescent in all horizons, but some pedons are noneffervescent to a depth of 4 inches. The control section is 0 to 15 percent gravel and 18 to 25 percent clay. Reaction in the A horizon is slightly alkaline or moderately alkaline.

Some pedons do not have a Bk horizon. In some pedons the Bk horizon extends to a depth of 60 inches.

Redthayne Series

The Redthayne series consists of very deep, well drained soils on side slopes of hills, ridges, and hogbacks. These soils formed in very channery loamy colluvium derived from various sources. Slopes are 3 to 30 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are loamy-skeletal, mixed Aridic Haploborolls.

Typical pedon of Redthayne channery loam, in an area of Redthayne-Tyzak-Rock outcrop complex, 15 to 45 percent slopes, 1,950 feet south and 2,350 feet east of the northwest corner of sec. 11, T. 15 N., R. 70 W.

A—0 to 8 inches; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; 30 percent channery fragments; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bw—8 to 14 inches; brown (7.5YR 5/3) very channery loam, dark brown (7.5YR 4/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; 40 percent channery fragments; slightly effervescent; calcium carbonate disseminated; slightly alkaline; clear smooth boundary.

Bk—14 to 60 inches; brown (7.5YR 5/4) very channery loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; 35 percent channery fragments, 20 percent cobbles; violently effervescent; calcium carbonate occurring as soft masses on channery fragments; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. The depth to horizons containing secondary calcium carbonate is 12 to 22 inches. The control section is 40 to 60 percent rock fragments. The Bw horizon is very channery loam or very channery clay loam. Reaction in the Bk horizon is moderately alkaline or strongly alkaline.

Taluce Series

The Taluce series consists of very shallow or shallow, well drained soils on hills and ridges. These soils formed in loamy residuum derived from sandstone. Slopes are 3 to 30 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Taluce fine sandy loam, in an area of Taluce-Taluce, thin solum-Rock outcrop complex, 3 to 30 percent slopes, 150 feet south and 1,900 feet east of the northwest corner of sec. 2, T. 19 N., R. 66 W.

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C—6 to 17 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cr—17 inches; semiconsolidated, violently effervescent sandstone.

The depth to semiconsolidated sandstone bedrock ranges from 4 to 20 inches. The control section is 0 to 15 percent gravel and 10 to 15 percent clay. Reaction in the A horizon is slightly alkaline or moderately alkaline. The C horizon is sandy loam or fine sandy loam.

Tassel Series

The Tassel series consists of shallow, well drained soils on hills and knolls. These soils formed in loamy residuum derived from sandstone. Slopes are 3 to 15 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of Tassel fine sandy loam, in an area of Otero-Valent-Tassel complex, 0 to 15 percent

slopes, 1,700 feet south and 200 feet east of the northwest corner of sec. 14, T. 18 N., R. 65 W.

A—0 to 7 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; violently effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C—7 to 12 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; violently effervescent; calcium carbonate disseminated; moderately alkaline; abrupt wavy boundary.

Cr—12 inches; semiconsolidated, violently effervescent, light gray sandstone.

The depth to sandstone bedrock is 10 to 20 inches. The control section is 0 to 15 percent gravel and 5 to 10 percent clay. Reaction is slightly alkaline or moderately alkaline throughout the profile.

Tieside Series

The Tieside series consists of shallow, well drained soils on hills and ridges. These soils formed in loamy residuum and colluvium derived from red sandstone. Slopes are 3 to 45 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are loamy, mixed, shallow Borollic Calciorthids.

Typical pedon of Tieside loam, in an area of Chalkcreek-Tieside loams, 0 to 6 percent slopes, 2,500 feet south and 2,500 feet west of the northeast corner of sec. 2, T. 15 N., R. 70 W.

A—0 to 3 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bw—3 to 11 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; strongly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Bk—11 to 19 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; violently effervescent; calcium carbonate occurring as soft masses; moderately alkaline; clear smooth boundary.

Cr—19 inches; semiconsolidated, effervescent sandstone.

The depth to bedrock is 10 to 20 inches. The control section is 0 to 15 percent gravel. Reaction is slightly alkaline or moderately alkaline throughout the profile. The A horizon has hue of 2.5YR or 5YR. The B horizons have hue of 2.5YR to 7.5YR. Calcium carbonate equivalent in the B horizons is 20 to 30 percent.

Treon Series

The Treon series consists of very shallow or shallow, well drained soils on hills, knolls, and ridges. These soils formed in loamy residuum derived from sandstone. Slopes are 3 to 30 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are loamy, mixed, mesic, shallow Torriorthentic Haplustolls.

Typical pedon of Treon fine sandy loam, in an area of Treon-Aberone-Treon, thin solum, fine sandy loams, 3 to 30 percent slopes, 950 feet north and 2,150 feet west of the southeast corner of sec. 33, T. 17 N., R. 65 W.

A—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C—8 to 16 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; strongly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cr—16 inches; semiconsolidated, violently effervescent, light gray sandstone.

The mollic epipedon is 4 to 10 inches thick. The depth to soft sandstone is 4 to 20 inches (fig. 7). These soils are commonly effervescent in all horizons, but some pedons are noneffervescent to a depth of 4 inches. The control section is 10 to 20 percent clay and 0 to 15 percent rock fragments. Reaction is

slightly alkaline or moderately alkaline throughout the profile. The C horizon is fine sandy loam or sandy loam.

Trimad Series

The Trimad series consists of very deep, well drained soils on hills, alluvial fans, and ridges. These soils formed in very gravelly loamy alluvium derived from various sources. Slopes are 6 to 45 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

The Trimad soils in this survey area are taxadjuncts because the A horizon is 7 to 10 inches thick and has value of 4 (dry). These soils are classified as loamy-skeletal, mixed Typic Calciborolls.

Typical pedon of Trimad gravelly loam, in an area of Trimad-Blazon complex, 15 to 45 percent slopes, 1,500 feet north and 2,400 feet east of the southwest corner of sec. 21, T. 17 N., R. 68 W.

A—0 to 8 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; 20 percent gravel; violently effervescent; calcium carbonate disseminated; moderately alkaline; abrupt wavy boundary.

Bk1—8 to 13 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; 20 percent gravel; violently effervescent; calcium carbonate occurring as soft masses and coatings on gravel; 25 percent calcium carbonate equivalent; moderately alkaline; clear smooth boundary.

Bk2—13 to 37 inches; very pale brown (10YR 7/3) very gravelly loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; 45 percent gravel; violently effervescent; calcium carbonate occurring as soft masses and coatings on gravel; 25 percent calcium carbonate equivalent; moderately alkaline; clear smooth boundary.

Bk3—37 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; 40 percent gravel; violently effervescent; calcium carbonate occurring as soft masses and coatings on gravel; 20 percent calcium carbonate equivalent; moderately alkaline.

The mollic epipedon is 7 to 10 inches thick. Calcium carbonate equivalent in the Bk horizons ranges from 15 to 35 percent (fig. 8). The average content of rock fragments in the control section ranges from 35 to 50 percent.

The A horizon is loam or gravelly loam. It is 0 to 35 percent gravel. The Bk1 horizon is very gravelly sandy loam, very gravelly loam, or gravelly loam. The Bk2 and Bk3 horizons are very gravelly sandy loam or very gravelly loam.

Turnercrest Series

The Turnercrest series consists of moderately deep, well drained soils on hills and alluvial fans. These soils formed in loamy residuum and eolian deposits derived from sandstone. Slopes are 3 to 15 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Turnercrest fine sandy loam, in an area of Taluce-Taluce, thin solum-Turnercrest fine sandy loams, 3 to 15 percent slopes, 700 feet north and 1,200 feet east of the southwest corner of sec. 6, T. 19 N., R. 65 W.

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

C—6 to 28 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly effervescent; calcium carbonate disseminated; moderately alkaline; clear smooth boundary.

Cr—28 inches; semiconsolidated, violently effervescent sandstone.

The depth to semiconsolidated sandstone is 20 to 40 inches. These soils are commonly effervescent in all horizons, but some pedons are noneffervescent to a depth of about 6 inches. The content of gravel ranges from 0 to 15 percent throughout. Reaction is slightly alkaline or moderately alkaline throughout. The C horizon is fine sandy loam or sandy loam.

Tyzak Series

The Tyzak series consists of very shallow or shallow, well drained soils on hills, ridges, and hogbacks. These soils formed in very channery loamy residuum and colluvium derived from limestone interbedded with sandstone and shale. Slopes are 10 to 50 percent. Elevation ranges from 6,500 to 7,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are loamy-skeletal, mixed Lithic Calciborolls.

Typical pedon of Tyzak channery loam, in an area of Redthayne-Tyzak-Rock outcrop complex, 15 to 45 percent slopes, 1,800 feet east and 50 feet south of the northwest corner of sec. 28, T. 19 N., R. 70 W.

A—0 to 7 inches; dark brown (10YR 3/3) channery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; 15 percent channery fragments; slightly effervescent; calcium carbonate occurring as coatings on channery fragments; moderately alkaline; clear smooth boundary.

Bk—7 to 15 inches; yellowish brown (10YR 5/4) very channery loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; 60 percent channery fragments; violently effervescent; 20 percent calcium carbonate equivalent; calcium carbonate occurring as soft masses and coatings on channery fragments; moderately alkaline; clear smooth boundary.

R—15 inches; consolidated, violently effervescent limestone.

The mollic epipedon is 7 to 10 inches thick. The depth to limestone bedrock is 10 to 20 inches. Calcium carbonate equivalent in the control section ranges from 15 to 35 percent. The control section averages 35 to 75 percent rock fragments and 18 to 27 percent clay. The rock fragments are dominantly channery fragments or gravel. The A horizon is very channery loam or channery loam. It is slightly alkaline or moderately alkaline. The Bk horizon is extremely channery loam, very gravelly loam, or very channery loam.

The thin solum Tyzak soils in map units 163 and 181 are taxadjuncts because they do not have a calcic horizon and have bedrock at a depth of 4 to 10 inches. The mollic epipedon is as thin as 4 inches in some pedons. These soils are classified as loamy-skeletal, mixed Lithic Haploborolls.

Valent Series

The Valent series consists of very deep, excessively drained soils on dunes and hills. These soils formed in sandy eolian deposits derived from sandstone. Slopes are 0 to 15 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are mixed, mesic Ustic Torripsamments.

Typical pedon of Valent loamy fine sand, moist, 0 to 6 percent slopes (fig. 9), 2,000 feet south and 50 feet east of the northwest corner of sec. 17, T. 18 N., R. 65 W.

A—0 to 10 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; abrupt wavy boundary.

C—10 to 60 inches; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; slightly alkaline.

The depth to horizons containing calcium carbonate is 40 inches or more. The control section is 3 to 10 percent clay. Reaction is neutral or slightly alkaline throughout the profile.

Vetal Series

The Vetal series consists of very deep, well drained soils on alluvial fans and in draws. These soils formed in loamy alluvium derived from sandstone. Slopes are 0 to 6 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed, mesic Pachic Haplustolls.

Typical pedon of Vetal fine sandy loam, 0 to 6 percent slopes, 800 feet north and 50 feet west of the southeast corner of sec. 3, T. 12 N., R. 65 W.

A1—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; neutral; clear smooth boundary.

A2—10 to 27 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.
AC—27 to 35 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; slightly alkaline; clear smooth boundary.
C—35 to 60 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; moderately alkaline.

The mollic epipedon is 20 to 40 inches thick. These soils are commonly noneffervescent throughout, but some pedons are effervescent at a depth of 30 inches or more. The control section is 0 to 5 percent gravel. The A horizon is fine sandy loam or loamy fine sand. It is neutral or slightly alkaline. The C horizon is slightly alkaline or moderately alkaline.

Vonalee Series

The Vonalee series consists of very deep, somewhat excessively drained soils on alluvial fans and terraces. These soils formed in loamy alluvium derived from sandstone. Slopes are 0 to 6 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are coarse-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Vonalee fine sandy loam, 0 to 6 percent slopes, 350 feet south and 950 feet east of the northwest corner of sec. 2, T. 19 N., R. 66 W.

A—0 to 6 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; clear smooth boundary.
Bt—6 to 24 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; few thin clay films bridging sand grains; slightly alkaline; clear smooth boundary.
Bk—24 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; slightly effervescent; calcium carbonate occurring as common fine threads; moderately alkaline.

The control section is 0 to 5 percent gravel. The depth to horizons containing secondary calcium carbonate is 11 to 40 inches (fig. 10). The Bt horizon is slightly alkaline or moderately alkaline.

Wages Series

The Wages series consists of very deep, well drained soils on alluvial fans, terraces, and knolls. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 6 percent. Elevation ranges from 5,000 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is 45 to 50 degrees F, and the average frost-free period is 120 to 140 days.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Wages loam, 0 to 6 percent slopes, 50 feet north and 50 feet west of the southeast corner of sec. 5, T. 17 N., R. 66 W.

A—0 to 7 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; slightly alkaline; clear smooth boundary.
Bt—7 to 13 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; hard, firm, sticky and plastic; many very fine roots; many distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.
Bk—13 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; violently effervescent; calcium carbonate occurring as seams and soft masses; moderately alkaline.

The mollic epipedon is 7 to 13 inches thick. The depth to horizons containing calcium carbonate is 11 to 14 inches. The Bt horizon has hue of 7.5YR or 10YR. The Bk horizon is sandy loam or loam.

Weed Series

The Weed series consists of very deep, well drained soils on toeslopes, footslopes, and alluvial fans and in draws. These soils formed in loamy alluvium derived from various sources. Slopes are 0 to 15 percent. Elevation ranges from 6,500 to 7,500 feet.

The average annual precipitation is about 15 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 100 days.

These soils are fine-loamy, mixed Pachic Argiborolls.

Typical pedon of Weed loam, 0 to 6 percent slopes, 350 feet north and 2,500 feet west of the southeast corner of sec. 8, T. 12 N., R. 67 W.

A—0 to 6 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly alkaline; abrupt wavy boundary.

Bt1—6 to 14 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine and fine roots and common medium roots; many distinct clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bt2—14 to 28 inches; dark brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; many distinct clay films on faces of peds; slightly effervescent; calcium carbonate disseminated; moderately alkaline; gradual wavy boundary.

Bk—28 to 60 inches; dark brown (10YR 4/3) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; strongly effervescent; calcium carbonate occurring as soft threads; moderately alkaline.

The mollic epipedon is 16 to 60 inches thick. The depth to horizons containing secondary calcium carbonate is 20 to 29 inches. The control section is 0 to 15 percent gravel and 27 to 35 percent clay. The A horizon is loam or sandy loam. The Bt horizons are sandy clay loam or clay loam. The Bk horizon is sandy loam, loam, sandy clay loam, or gravelly sandy clay loam. Reaction in the Bt horizon is slightly alkaline or moderately alkaline.

References

American Association of State Highway and Transportation Officials (AASHTO). 1986. Standard specifications for highway materials and methods of sampling and testing. 14th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 1993. Standard classification of soils for engineering purposes. ASTM Standard D 2487.

Centennial Historical Committee. 1961. Cheyenne—The magic city of the plains.

Homsher, Lola M. 1966. Wyoming—A student's guide to localized history.

Larson, T.A. 1977. Wyoming—A history.

Stands in Timber, John. 1967. Cheyenne memories.

United States Department of Agriculture. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture. 1983. Soil survey of Laramie County, Wyoming, eastern part. Soil Conservation Service and Wyoming Agricultural Experiment Station.

United States Department of Agriculture. 1992. Soil survey laboratory methods manual. Soil Survey Investigations Report 42, version 2.0.

United States Department of Agriculture. 1993. Soil survey manual. Soil Conservation Service, Soil Survey Staff, U.S. Department of Agriculture Handbook 18.

United States Department of Agriculture. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys, 2nd edition. Natural Resources Conservation Service, Soil Survey Staff, U.S. Department of Agriculture Handbook 436.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.5
Low	3.5 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep or very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition of woody understory and thus allow understory grasses and forbs to recover. Brush management increases production of forage and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is 15 to 35 percent, by volume, thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. Very channery soil material is 35 to 60 percent of these rock fragments, and extremely channery soil material is more than 60 percent. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation by use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly eounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop seeded in conjunction with a grass seeding operation to protect the soil until the grass seedlings have become well established.

Critical-area planting. Planting vegetation, such as trees, shrubs, grasses, or legumes, on highly erodible or critically eroding areas.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cuesta. An asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to control water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit the use of a full stripcropping pattern.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless artificial drainage is provided. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so

wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. They are wet enough to prevent the growth of important crops (except rice) unless artificially drained.

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. Synonym: scarp.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine earth. The particles of the soil that are smaller than 2 millimeters in diameter, or the sand, silt, and clay portion of the soil. (See Texture, soil.)

Fine textured soil. Sandy clay, silty clay, and clay.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (or 300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

High-residue crops. Crops such as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped

according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Crops such as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly

isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more

than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed. (See Climax plant community.)

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This increases the vigor and reproduction of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range renovation. Practices such as furrowing on the contour, pitting, chiseling, or disking. Improves plant cover by increasing the rate of water infiltration and the available moisture content.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material

that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 3 percent
Undulating	3 to 6 percent
Rolling	6 to 15 percent
Hilly	15 to 30 percent
Steep	30 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep soils, 20 to 40 inches; shallow soils, 10 to 20 inches; and very shallow soils, less than 10 inches.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summer wildlife habitat. A population or portion of a population uses this habitat annually during the summer but not during the winter.

Surface layer. In tilled soils, the part of the soil ordinarily moved in tillage ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon." In uncultivated soils, the part of the soil designated as the "A horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt,

and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Winter wildlife habitat. A population or portion of a population uses this habitat annually only during the winter. A substantial number of animals use the habitat during this period.

Year-long wildlife habitat. A population or a substantial portion of a population uses this habitat during all seasons of the year.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1916-93 at Cheyenne, Wyoming)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	37.3	15.1	26.2	61	-18	12	0.47	0.16	0.75	1	5.8
February	40.1	17.4	28.7	63	-13	17	0.53	0.19	0.83	1	6.7
March	44.1	21.4	32.8	68	-7	43	1.11	0.50	1.63	3	11.3
April	53.7	29.6	41.6	77	6	143	1.73	0.80	2.53	4	10.1
May	63.6	39.0	51.3	84	23	362	2.47	1.25	3.54	6	3.2
June	74.6	48.1	61.3	92	33	641	2.02	0.95	2.94	4	0.2
July	82.4	54.4	68.4	95	43	882	2.04	1.20	2.78	5	0.0
August	80.3	52.9	66.6	93	41	826	1.62	0.69	2.40	4	0.0
September	71.5	43.7	57.6	88	25	533	1.19	0.36	1.87	3	0.7
October	60.0	33.7	46.9	80	12	260	0.92	0.28	1.47	2	3.9
November	46.4	23.5	34.9	69	-4	60	0.66	0.22	1.03	1	7.4
December	39.5	17.6	28.5	63	-14	22	0.50	0.17	0.76	1	6.4
Yearly:											
Average---	57.8	33.0	45.4	---	---	---	---	---	---	---	---
Extreme---	---	---	---	95	-23	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,800	15.25	12.23	18.11	35	55.7

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1916-93 at Cheyenne, Wyoming)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 11	May 20	June 1
2 years in 10 later than--	May 6	May 15	May 27
5 years in 10 later than--	Apr. 25	May 4	May 16
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 27	Sept. 19	Sept. 12
2 years in 10 earlier than--	Oct. 3	Sept. 25	Sept. 17
5 years in 10 earlier than--	Oct. 15	Oct. 6	Sept. 27

Table 3.--Growing Season

(Recorded in the period 1916-93 at Cheyenne, Wyoming)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	144	132	111
8 years in 10	151	139	119
5 years in 10	165	152	133
2 years in 10	178	165	147
1 year in 10	185	172	155

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
100	Albinas loam, 0 to 6 percent slopes	25,096	2.5
101	Altvan loam, 0 to 6 percent slopes	18,234	1.8
102	Altvan-Dix complex, 6 to 10 percent slopes	18,043	1.8
103	Ascalon fine sandy loam, 6 to 9 percent slopes	432	*
104	Ascalon loam, 0 to 6 percent slopes	91,541	9.0
105	Bayard fine sandy loam, 0 to 15 percent slopes	3,266	0.3
106	Bayard fine sandy loam, wet, 0 to 3 percent slopes	783	0.1
107	Bayard-Paoli fine sandy loams, 0 to 10 percent slopes	7,064	0.7
108	Blazon-Blazon, thin solum-Poposhia silt loams, 0 to 6 percent slopes	4,695	0.5
109	Blazon-Chaperton complex, 3 to 20 percent slopes	10,051	1.0
110	Blazon-Chaperton-Rock outcrop complex, 10 to 45 percent slopes	2,018	0.2
111	Blazon-Trimad complex, 15 to 45 percent slopes	32,589	3.2
112	Boyle-Alderon-Cathedral complex, 5 to 45 percent slopes	5,408	0.5
113	Boyle-Boyle, thin solum, gravelly loams, 3 to 6 percent slopes	17,740	1.7
114	Boyle, thin solum-Breece-Cathedral complex, 0 to 30 percent slopes	5,412	0.5
115	Boyle, very stony-Boyle, thin solum-Lininger complex, 20 to 45 percent slopes	3,125	0.3
116	Boyle-Lininger-Boyle, thin solum, complex, 3 to 45 percent slopes	13,589	1.3
117	Boyle-Rock outcrop-Cathedral complex, 5 to 45 percent slopes	11,160	1.1
118	Boyle-Lininger association, 1 to 15 percent slopes	8,395	0.8
119	Breece fine sandy loam, 0 to 10 percent slopes	3,165	0.3
120	Bresser sandy loam, 0 to 3 percent slopes	224	*
121	Cantle loam, 0 to 3 percent slopes	168	*
122	Cantle-Merden, saline, complex, 0 to 3 percent slopes	2,731	0.3
123	Cathedral-Boyle complex, 10 to 30 percent slopes	7,201	0.7
124	Chalkcreek family, 0 to 3 percent slopes	232	*
125	Chalkcreek-Tieside loams, 0 to 6 percent slopes	1,071	0.1
126	Chivington loam, 0 to 6 percent slopes	4,371	0.4
127	Cowestglen fine sandy loam, 0 to 3 percent slopes	673	0.1
128	Dalecreek-Kovich, cool, loams, 0 to 9 percent slopes	2,763	0.3
129	Dix-Altvan complex, 10 to 30 percent slopes	9,458	0.9
130	Embry loamy fine sand, 2 to 10 percent slopes	1,609	0.2
131	Evanston loam, 0 to 6 percent slopes	123,697	12.1
132	Evanston-Weed complex, 3 to 35 percent slopes	3,221	0.3
133	Evanston-Weed-Trimad loams, 3 to 15 percent slopes	16,578	1.6
134	Evanston-Ipson association, 3 to 20 percent slopes	10,850	1.1
135	Haverdad-Clarkelen-Kovich, warm, complex, 0 to 3 percent slopes	1,777	0.2
136	Haverson loam, 0 to 3 percent slopes	53	*
137	Ipson-Breece, dry-Evanston complex, 0 to 6 percent slopes	12,019	1.2
138	Ipson-Evanston complex, 6 to 30 percent slopes	103,045	10.1
139	Ipson-Evanston-Rock outcrop complex, 0 to 30 percent slopes	5,812	0.6
140	Ipson-Pinelli-Rock outcrop complex, 6 to 45 percent slopes	3,499	0.3
141	Ipson-Trimad complex, 15 to 45 percent slopes	7,811	0.8
142	Manter sandy loam, 0 to 6 percent slopes	17,527	1.7
143	Manter fine sandy loam, 6 to 30 percent slopes	4,157	0.4
144	Manter-Treon fine sandy loams, 0 to 15 percent slopes	1,716	0.2
145	Merden silty clay loam, 0 to 3 percent slopes	3,491	0.3
146	Merden, cool-Kovich complex, 0 to 3 percent slopes	10,353	1.0
147	Mitchell silt loam, 0 to 6 percent slopes	5,949	0.6
148	Moskee fine sandy loam, 0 to 3 percent slopes	2,469	0.2
149	Nucla loam, 0 to 3 percent slopes	122	*
150	Otero fine sandy loam, 0 to 6 percent slopes	2,145	0.2
151	Otero-Valent-Tassel complex, 0 to 15 percent slopes	11,425	1.1
152	Paoli fine sandy loam, 0 to 3 percent slopes	6,764	0.7
153	Paoli fine sandy loam, 6 to 9 percent slopes	74	*
154	Peetz gravelly sandy loam, 5 to 20 percent slopes	674	0.1
155	Peetz-Altvan complex, 0 to 20 percent slopes	123	*
156	Pinelli loam, 3 to 10 percent slopes	1,156	0.1
157	Pinelli-Chivington complex, 0 to 15 percent slopes	5,649	0.6
158	Poposhia silt loam, 0 to 6 percent slopes	15,571	1.5
159	Poposhia-Blazon silt loams, 3 to 30 percent slopes	7,590	0.7

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
160	Poposhia-Blazon, thin solum-Rock outcrop complex, 5 to 35 percent slopes	8,873	0.9
161	Poposhia-Piezon silt loams, 0 to 6 percent slopes	3,758	0.4
162	Poposhia-Trimad complex, 3 to 15 percent slopes	52,750	5.2
163	Redthayne-Tyzak, thin solum-Evanston complex, 0 to 15 percent slopes	2,613	0.3
164	Redthayne-Tyzak-Rock outcrop complex, 15 to 45 percent slopes	7,962	0.8
165	Riverwash	1,373	0.1
166	Rock outcrop-Blazon, thin solum, complex, 30 to 60 percent slopes	2,502	0.2
167	Rock outcrop-Cathedral complex, 20 to 40 percent slopes	17,776	1.7
168	Taluce-Taluce, thin solum-Rock outcrop complex, 3 to 30 percent slopes	1,737	0.2
169	Taluce-Taluce, thin solum-Turnercrest fine sandy loams, 3 to 15 percent slopes	3,310	0.3
170	Tieside, north slopes-Rock outcrop complex, 10 to 45 percent slopes	3,022	0.3
171	Treon-Aberone fine sandy loams, 6 to 30 percent slopes	27,148	2.7
172	Treon-Aberone-Treon, thin solum, fine sandy loams, 3 to 30 percent slopes	8,672	0.9
173	Treon, dry-Aberone fine sandy loams, 10 to 30 percent slopes	3,586	0.4
174	Treon, thin solum-Rock outcrop-Treon complex, 6 to 30 percent slopes	4,309	0.4
175	Treon, dry-Bayard association, 3 to 30 percent slopes	1,859	0.2
176	Trimad-Blazon complex, 15 to 45 percent slopes	16,428	1.6
177	Trimad-Blazon, thin solum-Rock outcrop complex, 20 to 45 percent slopes	19,579	1.9
178	Trimad-Evanston complex, 3 to 30 percent slopes	1,892	0.2
179	Trimad-Poposhia complex, dry, 6 to 15 percent slopes	5,888	0.6
180	Trimad-Weed-Blazon association, 0 to 15 percent slopes	19,791	1.9
181	Tyzak-Tyzak, thin solum-Rock outcrop complex, 30 to 50 percent slopes	9,557	0.9
182	Urban land-Albinas complex, 0 to 6 percent slopes	219	*
183	Urban land-Altvan complex, 0 to 6 percent slopes	2,792	0.3
184	Urban land-Ascalon complex, 0 to 6 percent slopes	5,722	0.6
185	Urban land-Bayard complex, 0 to 15 percent slopes	113	*
186	Urban land-Evanston complex, 0 to 6 percent slopes	2,241	0.2
187	Urban land-Merden complex, 0 to 3 percent slopes	887	0.1
188	Urban land-Poposhia complex, 0 to 6 percent slopes	5,025	0.5
189	Urban land-Poposhia-Trimad complex, 3 to 15 percent slopes	5,934	0.6
190	Valent loamy fine sand, moist, 0 to 6 percent slopes	15,351	1.5
191	Valent-Treon complex, 6 to 30 percent slopes	3,230	0.3
192	Vetal fine sandy loam, 0 to 6 percent slopes	5,534	0.5
193	Vetal loamy fine sand, 0 to 6 percent slopes	3,117	0.3
194	Vonalee fine sandy loam, 0 to 6 percent slopes	960	0.1
195	Wages loam, 0 to 6 percent slopes	12,775	1.3
196	Weed loam, 0 to 6 percent slopes	32,455	3.2
	Water	910	0.1
	Total	1,019,274	100.0

* Less than 0.05 percent.

Table 5.--Land Capability and Yields per Acre of Crops

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Alfalfa hay		Grass hay		Winter wheat	
	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	Bu	Bu
100:								
Albinas	IIIe	IIIe	---	4.00	---	3.00	45.00	---
101:								
Altvan	IIIe	IIIe	---	4.00	---	---	32.00	---
102:								
Altvan	IVe	IVe	---	3.50	---	---	24.00	---
Dix	VIIs	VIs	---	2.00	---	---	10.00	---
103:								
Ascalon	VIe	---	---	---	---	---	---	---
104:								
Ascalon	IIIe	IIIe	---	---	---	3.00	40.00	---
105:								
Bayard	IVe	IIIe	---	4.00	---	---	---	---
106:								
Bayard, wet	IVe	IIIe	---	---	---	3.00	---	---
107:								
Bayard	IVe	IIIe	---	4.00	---	---	---	---
Paoli	IIIe	IIIe	---	4.00	---	---	---	---
108:								
Blazon	VIIe	---	---	---	---	---	---	---
Blazon, thin solum	VIIe	---	---	---	---	---	---	---
Poposhia	IVe	---	---	---	---	---	---	---
109:								
Blazon	VIIe	---	---	---	---	---	---	---
Chaperton	VIe	---	---	---	---	---	---	---
110:								
Blazon	VIIe	---	---	---	---	---	---	---
Chaperton	VIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
111:								
Blazon	VIIe	---	---	---	---	---	---	---
Trimad	VIIe	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
112:								
Boyle	VIIe	---	---	---	---	---	---	---
Alderon	VIe	---	---	---	---	---	---	---
Cathedral	VIIe	---	---	---	---	---	---	---
113:								
Boyle	VIIe	---	---	---	---	---	---	---
Boyle, thin solum	VIIe	---	---	---	---	---	---	---
114:								
Boyle, thin solum	VIIe	---	---	---	---	---	---	---
Breece	IVe	---	---	---	---	---	---	---
Cathedral	VIIe	---	---	---	---	---	---	---
115:								
Boyle, very stony	VIIe	---	---	---	---	---	---	---
Boyle, thin solum	VIIe	---	---	---	---	---	---	---
Lininger	VIe	---	---	---	---	---	---	---
116:								
Boyle	VIIe	---	---	---	---	---	---	---
Lininger	VIe	---	---	---	---	---	---	---
Boyle, thin solum	VIIe	---	---	---	---	---	---	---
117:								
Boyle	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
Cathedral	VIIe	---	---	---	---	---	---	---
118:								
Boyle	VIIe	---	---	---	---	---	---	---
Lininger	IVe	---	---	---	---	---	---	---
119:								
Breece	IVe	IVe	---	---	---	2.00	---	---
120:								
Bresser	IVe	---	---	---	---	---	---	---
121:								
Cantle	IVw	IVw	---	---	---	2.00	---	---
122:								
Cantle	IVw	IVw	---	---	---	2.00	---	---
Merden, saline	IVw	IVw	---	---	---	2.00	---	---
123:								
Cathedral	VIIe	---	---	---	---	---	---	---
Boyle	VIIe	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
124:								
Chalkcreek Family	IVw	IVw	---	---	---	2.00	---	---
125:								
Chalkcreek	IVe	---	---	---	---	---	---	---
Tieside	VIIe	---	---	---	---	---	---	---
126:								
Chivington	IVe	---	---	---	---	---	---	---
127:								
Cowestglen	IVe	IVe	---	---	---	3.00	---	---
128:								
Dalecreek	IVw	IVw	---	---	---	2.00	---	---
Kovich, cool	IVw	IVw	---	---	---	2.00	---	---
129:								
Dix	VIIs	VIs	---	1.00	---	---	---	---
Altvan	IVe	IVe	---	3.50	---	---	---	---
130:								
Embry	IVe	---	---	---	---	---	---	---
131:								
Evanston	IVe	---	---	---	---	---	30.00	---
132:								
Evanston	VIe	---	---	---	---	---	---	---
Weed	IVe	---	---	---	---	---	---	---
133:								
Evanston	IVe	---	---	---	---	---	---	---
Weed	IVe	---	---	---	---	---	---	---
Trimad	VIs	---	---	---	---	---	---	---
134:								
Evanston	IVe	---	---	---	---	---	---	---
Ipson	VIe	---	---	---	---	---	---	---
135:								
Haverdad	IIIe	IIIe	---	---	---	3.00	---	---
Clarkelen	IIIe	IIIe	---	---	---	3.00	---	---
Kovich, warm	IVw	IVw	---	---	---	3.00	---	---
136:								
Haverson	IVe	---	---	---	---	---	---	---
137:								
Ipson	IVe	---	---	---	---	---	30.00	---
Breece, dry	IVe	---	---	---	---	---	30.00	---
Evanston	IVe	---	---	---	---	---	30.00	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
138:								
Ipson	VIe	---	---	---	---	---	---	---
Evanston	IVe	---	---	---	---	---	---	---
139:								
Ipson	VIe	---	---	---	---	---	---	---
Evanston	IVe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
140:								
Ipson	VIe	---	---	---	---	---	---	---
Pinelli	IVe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
141:								
Ipson	VIe	---	---	---	---	---	---	---
Trimad	VIIe	---	---	---	---	---	---	---
142:								
Manter	IIIe	---	---	---	---	---	32.00	---
143:								
Manter	VIe	---	---	---	---	---	---	---
144:								
Manter	IVe	---	---	---	---	---	---	---
Treon	VIIe	---	---	---	---	---	---	---
145:								
Merden	IVw	IVw	---	---	---	3.00	---	---
146:								
Merden, cool	IVw	IVw	---	---	---	2.00	---	---
Kovich	IVw	IVw	---	---	---	2.00	---	---
147:								
Mitchell	IIIe	---	---	---	---	---	32.00	---
148:								
Moskee	IIIe	---	---	---	---	---	---	---
149:								
Nucla	IIIe	---	---	---	---	---	---	---
150:								
Otero	IIIe	---	---	---	---	---	32.00	---
151:								
Otero	IVe	IVe	---	3.50	---	---	---	---
Valent	VIe	IVe	---	3.00	---	---	---	---
Tassel	VIIe	VIIe	---	0.50	---	---	---	---
152:								
Paoli	IIIe	---	---	---	---	---	30.00	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
153:								
Paoli	IVe	---	---	---	---	---	---	---
154:								
Peetz	VIe	---	---	---	---	---	---	---
155:								
Peetz	VIe	---	---	---	---	---	---	---
Altvan	IVe	---	---	---	---	---	---	---
156:								
Pinelli	IVe	IVe	---	---	---	2.00	---	---
157:								
Pinelli	IVe	---	---	---	---	---	---	---
Chivington	IVe	---	---	---	---	---	---	---
158:								
Poposhia	IVe	---	---	---	---	---	---	---
159:								
Poposhia	IVe	---	---	---	---	---	---	---
Blazon	VIIe	---	---	---	---	---	---	---
160:								
Poposhia	IVe	---	---	---	---	---	---	---
Blazon, thin solum	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
161:								
Poposhia	IVe	---	---	---	---	---	---	---
Piezon	IVe	---	---	---	---	---	---	---
162:								
Poposhia	IVe	---	---	---	---	---	25.00	---
Trimad	VIs	---	---	---	---	---	10.00	---
163:								
Redthayne	VIs	---	---	---	---	---	---	---
Tyzak, thin solum	VIIe	---	---	---	---	---	---	---
Evanston	IVe	---	---	---	---	---	---	---
164:								
Redthayne	VIe	---	---	---	---	---	---	---
Tyzak	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
165:								
Riverwash	VIIIw	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
166:								
Rock outcrop	VIIIs	---	---	---	---	---	---	---
Blazon, thin solum	VIIe	---	---	---	---	---	---	---
167:								
Rock outcrop	VIIIs	---	---	---	---	---	---	---
Cathedral	VIIe	---	---	---	---	---	---	---
168:								
Taluce	VIIe	---	---	---	---	---	---	---
Taluce, thin solum	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
169:								
Taluce	VIIe	---	---	---	---	---	---	---
Taluce, thin solum	VIIe	---	---	---	---	---	---	---
Turnercrest	IVe	---	---	---	---	---	---	---
170:								
Tieside, north slopes	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
171:								
Treon	VIIe	VIIe	---	---	---	0.50	---	---
Aberone	VIs	VIs	---	---	---	2.00	---	---
172:								
Treon	VIIe	---	---	---	---	---	---	---
Aberone	VIs	---	---	---	---	---	---	---
Treon, thin solum	VIIe	---	---	---	---	---	---	---
173:								
Treon, dry	VIIe	---	---	---	---	---	---	---
Aberone	VIs	---	---	---	---	---	---	---
174:								
Treon, thin solum	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
Treon	VIIe	---	---	---	---	---	---	---
175:								
Treon, dry	VIIe	---	---	---	---	---	---	---
Bayard	IVe	---	---	---	---	---	---	---
176:								
Trimad	VIe	---	---	---	---	---	---	---
Blazon	VIIe	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
177:								
Trimad	VIIe	---	---	---	---	---	---	---
Blazon, thin solum	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
178:								
Trimad	VIe	---	---	---	---	---	---	---
Evanston	IVe	---	---	---	---	---	---	---
179:								
Trimad, dry	VIs	---	---	---	---	---	---	---
Poposhia, dry	IVe	---	---	---	---	---	---	---
180:								
Trimad	VIs	---	---	---	---	---	---	---
Weed	IVe	---	---	---	---	---	---	---
Blazon	VIIe	---	---	---	---	---	---	---
181:								
Tyzak	VIIe	---	---	---	---	---	---	---
Tyzak, thin solum	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
182:								
Urban land.								
Albinas	IIIe	---	---	---	---	---	---	---
183:								
Urban land.								
Altvan	IIIe	---	---	---	---	---	---	---
184:								
Urban land.								
Ascalon	IIIe	---	---	---	---	---	---	---
185:								
Urban land.								
Bayard	IVe	---	---	---	---	---	---	---
186:								
Urban land.								
Evanston	IVe	---	---	---	---	---	---	---
187:								
Urban land.								
Merden	IVw	---	---	---	---	---	---	---
188:								
Urban land.								
Poposhia	IVe	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Grass hay N	Grass hay I	Winter wheat N	Winter wheat I
			Tons	Tons	Tons	Tons	Bu	Bu
189:								
Urban land.								
Poposhia	IVe	---	---	---	---	---	---	---
Trimad	VIs	---	---	---	---	---	---	---
190:								
Valent	VIe	IVe	---	3.00	---	---	---	---
191:								
Valent	VIe	---	---	---	---	---	---	---
Treon	VIIe	---	---	---	---	---	---	---
192:								
Vetal	IIIe	---	---	---	---	---	---	---
193:								
Vetal	IVe	---	---	---	---	---	---	---
194:								
Vonalee	IIIe	---	---	---	---	---	---	---
195:								
Wages	IIIe	IIIe	---	4.00	---	---	40.00	---
196:								
Weed	IVe	---	---	---	---	---	---	---

Table 6.--Soil-Pesticide Loss Potential

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
100: Albinas	Moderate: low adsorption.	Moderate: runoff.
101: Altvan	Moderate: poor filter.	Moderate: runoff.
102:		
Altvan	Moderate: poor filter.	Moderate: runoff.
Dix	Severe: low adsorption, poor filter.	Moderate: runoff.
103: Ascalon	Slight	Moderate: runoff.
104: Ascalon	Slight	Moderate: runoff.
105: Bayard	Moderate: low adsorption.	Moderate: runoff.
106: Bayard, wet	Moderate: wetness.	Moderate: flooding.
107:		
Bayard	Moderate: low adsorption.	Moderate: runoff.
Paoli	Slight	Moderate: runoff.
108:		
Blazon	Slight*	Severe: runoff.
Blazon, thin solum	Slight*	Severe: runoff.
Poposhia	Slight	Moderate: runoff.
109:		
Blazon	Slight*	Severe: runoff.
Chaperton	Slight*	Moderate: runoff.
110:		
Blazon	Slight*	Severe: runoff.
Chaperton	Slight*	Severe: runoff.
Rock outcrop.*		

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
111:		
Blazon	Slight*	Severe: runoff.
Trimad	Slight	Severe: runoff.
112:		
Boyle	Slight*	Severe: runoff.
Alderon	Slight*	Severe: runoff.
Cathedral	Slight*	Severe: runoff.
113:		
Boyle	Severe*: poor filter.	Moderate: runoff.
Boyle, thin solum	Slight*	Moderate: runoff.
114:		
Boyle, thin solum	Slight*	Moderate: runoff.
Breece	Moderate: low adsorption.	Slight.
Cathedral	Slight*	Severe: runoff.
115:		
Boyle, very stony	Slight*	Severe: runoff.
Boyle, thin solum	Slight*	Severe: runoff.
Lininger	Slight*	Severe: runoff.
116:		
Boyle	Slight*	Moderate: runoff.
Lininger	Slight*	Severe: runoff.
Boyle, thin solum	Slight*	Severe: runoff.
117:		
Boyle	Slight*	Moderate: runoff.
Rock outcrop.*		
Cathedral	Slight*	Severe: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
118:		
Boyle	Slight*	Moderate: runoff.
Lininger	Slight*	Moderate: runoff.
119 Breece	Moderate: low adsorption.	Moderate: runoff.
120 Bresser	Moderate: poor filter.	Slight.
121 Cantle	Severe: wetness.	Moderate: flooding.
122:		
Cantle	Severe: wetness.	Moderate: flooding.
Merden, saline	Severe: wetness.	Severe: flooding.
123:		
Cathedral	Slight*	Severe: runoff.
Boyle	Slight*	Severe: runoff.
124 Chalkcreek Family	Moderate: wetness.	Slight.
125:		
Chalkcreek	Slight	Slight.
Tieside	Slight*	Severe: runoff.
126 Chivington	Slight	Moderate: runoff.
127 Cowestglen	Slight	Moderate: flooding.
128:		
Dalecreek	Moderate: wetness.	Moderate: runoff.
Kovich, cool	Severe: wetness.	Severe: runoff.
129:		
Dix	Severe: poor filter.	Moderate: runoff.
Altvan	Moderate: poor filter.	Moderate: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
130 Embry	Slight	Moderate: runoff.
131 Evanston	Slight	Moderate: runoff.
132:		
Evanston	Slight	Severe: runoff.
Weed	Moderate: low adsorption.	Moderate: runoff.
133:		
Evanston	Slight	Moderate: runoff.
Weed	Moderate: low adsorption.	Moderate: runoff.
Trimad	Slight	Moderate: runoff.
134:		
Evanston	Slight	Moderate: runoff.
Ipson	Slight	Moderate: runoff.
135:		
Haverdad	Moderate: poor filter.	Moderate: flooding.
Clarkelen	Moderate: low adsorption, wetness.	Moderate: flooding.
Kovich, warm	Severe: wetness.	Moderate: flooding.
136 Haverson	Slight	Slight.
137:		
Ipson	Slight	Moderate: runoff.
Breece, dry	Moderate: low adsorption.	Slight.
Evanston	Slight	Moderate: runoff.
138:		
Ipson	Slight	Severe: runoff.
Evanston	Slight	Moderate: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
139:		
Ipson	Slight	Severe: runoff.
Evanston	Slight	Moderate: runoff.
Rock outcrop.*		
140:		
Ipson	Slight	Severe: runoff.
Pinelli	Slight	Moderate: runoff.
Rock outcrop.*		
141:		
Ipson	Slight	Severe: runoff.
Trimad	Slight	Severe: runoff.
142 Manter	Slight	Moderate: runoff.
143 Manter	Slight	Severe: runoff.
144:		
Manter	Slight	Moderate: runoff.
Treon	Slight*	Moderate: runoff.
145 Merden	Severe: wetness.	Severe: flooding.
146:		
Merden, cool	Severe: wetness.	Severe: flooding.
Kovich	Severe: wetness.	Slight.
147 Mitchell	Moderate: low adsorption.	Moderate: runoff.
148 Moskee	Slight	Slight.
149 Nucla	Moderate: low adsorption.	Slight.
150 Otero	Slight	Moderate: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
151:		
Otero	Slight	Moderate: runoff.
Valent	Severe: poor filter.	Slight.
Tassel	Slight*	Severe: runoff.
152 Paoli	Slight	Slight.
153 Paoli	Moderate: low adsorption.	Moderate: runoff.
154 Peetz	Severe: poor filter.	Moderate: runoff.
155:		
Peetz	Severe: poor filter.	Moderate: runoff.
Altvan	Severe: poor filter.	Moderate: runoff.
156 Pinelli	Slight	Moderate: runoff.
157:		
Pinelli	Slight	Moderate: runoff.
Chivington	Slight	Moderate: runoff.
158 Poposhia	Slight	Moderate: runoff.
159:		
Poposhia	Slight	Moderate: runoff.
Blazon	Slight*	Severe: runoff.
160:		
Poposhia	Slight	Moderate: runoff.
Blazon, thin solum	Slight*	Severe: runoff.
Rock outcrop.*		
161:		
Poposhia	Slight	Moderate: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
161:		
Piezon	Slight*	Moderate: runoff.
162:		
Poposhia	Slight	Moderate: runoff.
Trimad	Slight	Moderate: runoff.
163:		
Redthayne	Slight	Moderate: runoff.
Tyzak, thin solum	Slight*	Moderate: runoff.
Evanston	Slight	Moderate: runoff.
164:		
Redthayne	Slight	Severe: runoff.
Tyzak	Slight*	Severe: runoff.
Rock outcrop.*		
165 Riverwash	Severe: wetness.	Severe: flooding.
166:		
Rock outcrop.*		
Blazon, thin solum	Slight*	Severe: runoff.
167:		
Rock outcrop.*		
Cathedral	Slight*	Severe: runoff.
168:		
Taluce	Slight*	Severe: runoff.
Taluce, thin solum	Slight*	Moderate: runoff.
Rock outcrop.*		
169:		
Taluce	Slight*	Moderate: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
169:		
Taluce, thin solum	Slight*	Moderate: runoff.
Turnercrest	Slight*	Moderate: runoff.
170:		
Tieside, north slopes	Slight*	Severe: runoff.
Rock outcrop.*		
171:		
Treon	Slight*	Severe: runoff.
Aberone	Slight	Moderate: runoff.
172:		
Treon	Slight*	Severe: runoff.
Aberone	Slight	Moderate: runoff.
Treon, thin solum	Slight*	Severe: runoff.
173:		
Treon, dry	Slight*	Severe: runoff.
Aberone	Slight	Severe: runoff.
174:		
Treon, thin solum	Slight*	Severe: runoff.
Rock outcrop.*		
Treon	Slight*	Severe: runoff.
175:		
Treon, dry	Slight*	Severe: runoff.
Bayard	Moderate: low adsorption.	Moderate: runoff.
176:		
Trimad	Slight	Severe: runoff.
Blazon	Slight*	Severe: runoff.

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
177:		
Trimad	Slight	Severe: runoff.
Blazon, thin solum	Slight*	Severe: runoff.
Rock outcrop.*		
178:		
Trimad	Slight	Severe: runoff.
Evanston	Slight	Moderate: runoff.
179:		
Trimad, dry	Slight	Moderate: runoff.
Poposhia, dry	Slight	Moderate: runoff.
180:		
Trimad	Slight	Moderate: runoff.
Weed	Severe: low adsorption.	Moderate: runoff.
Blazon	Slight*	Severe: runoff.
181:		
Tyzak	Slight*	Severe: runoff.
Tyzak, thin solum	Slight*	Severe: runoff.
Rock outcrop.*		
182:		
Urban land.		
Albinas	Moderate: low adsorption.	Moderate: runoff.
183:		
Urban land.		
Altvan	Severe: poor filter.	Moderate: runoff.
184:		
Urban land.		
Ascalon	Slight	Moderate: runoff.
185:		
Urban land.		

See footnote at end of table.

Table 6.--Soil-Pesticide Loss Potential--Continued

Map symbol and soil name	Pesticide loss potential	
	Leaching	Runoff
185:		
Bayard	Moderate: low adsorption.	Moderate: runoff.
186:		
Urban land.		
Evanston	Slight	Moderate: runoff.
187:		
Urban land.		
Merden	Severe: wetness.	Severe: flooding.
188:		
Urban land.		
Poposhia	Slight	Moderate: runoff.
189:		
Urban land.		
Poposhia	Slight	Moderate: runoff.
Trimad	Slight	Moderate: runoff.
190 Valent	Severe: poor filter.	Slight.
191:		
Valent	Severe: poor filter.	Moderate: runoff.
Treon	Slight*	Severe: runoff.
192 Vetal	Moderate: low adsorption.	Moderate: runoff.
193 Vetal	Moderate: low adsorption.	Slight.
194 Vonalee	Slight	Moderate: runoff.
195 Wages	Slight	Moderate: runoff.
196 Weed	Moderate: low adsorption.	Moderate: runoff.

* Permeability criteria were not evaluated for bedrock.

Table 7.--Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are listed.)

Map symbol and and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
100:					
Albinas	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
101:					
Altvan	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
102*:					
Altvan	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
Dix	Gravelly (15-17") Southern Plains	Favorable	900	little bluestem	30
		Normal	600	bluebunch wheatgrass	25
		Unfavorable	400	needleandthread	10
				Indian ricegrass	10
				western wheatgrass	10
				yucca	5
103, 104:					
Ascalon	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
105:					
Bayard	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspike wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
106:					
Bayard, wet	Lowland (15-17") Southern Plains	Favorable	3,000	needleandthread	20
		Normal	2,500	western wheatgrass	20
		Unfavorable	1,800	eastern cottonwood	15
				Indian ricegrass	10
				little bluestem	10
				prairie junegrass	5
				Canada wildrye	5
				silver sagebrush	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
107*					
Bayard	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
Paoli	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
108*:					
Blazon	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				needleandthread	5
				blue grama	5
Blazon, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Poposhia	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				winterfat	5
				big sagebrush	5
109*:					
Blazon	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				needleandthread	5
				blue grama	5
Chaperton	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
110*:					
Blazon	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				needleandthread	5
				blue grama	5
Chaperton	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				winterfat	5
				little bluestem	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
110*:					
Rock outcrop.					
111*:					
Blazon	Shallow Loamy (15-17")	Favorable	1,400	bluebunch wheatgrass	25
	Southern Plains	Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				blue grama	5
				needleandthread	5
Trimad	Loamy (15-17")	Favorable	1,900	needleandthread	35
	Southern Plains	Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
112*:					
Boyle	Shallow Igneous (15-19")	Favorable	1,200	bluebunch wheatgrass	25
	Foothills and Mountains	Normal	900	slimstem muhly	15
	Southeast	Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				black sagebrush	5
				western wheatgrass	5
				winterfat	5
Alderon.					
Cathedral	Shallow Igneous (15-19")	Favorable	1,200	bluebunch wheatgrass	25
	Foothills and Mountains	Normal	900	slimstem muhly	15
	Southeast	Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				western wheatgrass	5
				winterfat	5
113*:					
Boyle	Shallow Igneous (15-19")	Favorable	1,200	bluebunch wheatgrass	25
	Foothills and Mountains	Normal	900	slimstem muhly	15
	Southeast	Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				black sagebrush	5
				western wheatgrass	5
				winterfat	5
Boyle, thin solum	Igneous (15-19")	Favorable	700	bluebunch wheatgrass	35
	Foothills and Mountains	Normal	550	slimstem muhly	15
	Southeast	Unfavorable	350	black sagebrush	10
				threetip sagebrush	10
				Griffith wheatgrass	5
				Idaho fescue	5
114*:					
Boyle, thin solum	Igneous (15-19")	Favorable	700	bluebunch wheatgrass	35
	Foothills and Mountains	Normal	550	slimstem muhly	15
	Southeast	Unfavorable	350	black sagebrush	10
				threetip sagebrush	10
				Griffith wheatgrass	5
				Idaho fescue	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
114*:					
Breece	Loamy (15-19") Foothills and Mountains Southeast	Favorable	2,000	Idaho fescue	20
		Normal	1,500	bluebunch wheatgrass	20
		Unfavorable	800	Griffith wheatgrass	10
				prairie junegrass	10
				big sagebrush	5
				threetip sagebrush	5
Cathedral	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				western wheatgrass	5
				winterfat	5
115*:					
Boyle, very stony	Rocky Hills (15-19") Foothills and Mountains Southeast	Favorable	1,150	true mountain mahogany	30
		Normal	900	bluebunch wheatgrass	20
		Unfavorable	550	needleandthread	15
				spike fescue	15
				antelope bitterbrush	10
Boyle, thin solum	Rocky Hills (15-19") Foothills and Mountains Southeast	Favorable	1,150	true mountain mahogany	30
		Normal	900	bluebunch wheatgrass	20
		Unfavorable	550	needleandthread	15
				spike fescue	15
				antelope bitterbrush	10
Lininger	Loamy (15-19") Foothills and Mountains Southeast	Favorable	2,000	Idaho fescue	20
		Normal	1,500	bluebunch wheatgrass	20
		Unfavorable	800	Griffith wheatgrass	10
				prairie junegrass	10
				big sagebrush	5
				threetip sagebrush	5
116*:					
Boyle	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				black sagebrush	5
				western wheatgrass	5
				winterfat	5
Lininger	Loamy (15-19") Foothills and Mountains Southeast	Favorable	2,000	Idaho fescue	20
		Normal	1,500	bluebunch wheatgrass	20
		Unfavorable	800	Griffith wheatgrass	10
				prairie junegrass	10
				big sagebrush	5
				threetip sagebrush	5
Boyle, thin solum	Igneous (15-19") Foothills and Mountains Southeast	Favorable	700	bluebunch wheatgrass	35
		Normal	550	slimstem muhly	15
		Unfavorable	350	black sagebrush	10
				threetip sagebrush	10
				Griffith wheatgrass	5
				Idaho fescue	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
117*:					
Boyle	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				black sagebrush	5
				western wheatgrass	5
				winterfat	5
Rock outcrop.					
Cathedral	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				western wheatgrass	5
				winterfat	5
118*:					
Boyle	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				black sagebrush	5
				western wheatgrass	5
				winterfat	5
Lininger	Loamy (15-19") Foothills and Mountains Southeast	Favorable	2,000	Idaho fescue	20
		Normal	1,500	bluebunch wheatgrass	20
		Unfavorable	800	Griffith wheatgrass	10
				prairie junegrass	10
				big sagebrush	5
				threetip sagebrush	5
119:					
Breece	Loamy (15-19") Foothills and Mountains Southeast	Favorable	2,000	Idaho fescue	20
		Normal	1,500	bluebunch wheatgrass	20
		Unfavorable	800	Griffith wheatgrass	10
				prairie junegrass	10
				big sagebrush	5
				threetip sagebrush	5
120:					
Bresser	Sandy (15-17") Southern Plains	Favorable	1,800	little bluestem	20
		Normal	1,400	needleandthread	15
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
121:					
Cantle	Subirrigated (15-17") Southern Plains	Favorable	5,000	big bluestem	35
		Normal	4,500	willow	15
		Unfavorable	3,500	Indiangrass	10
				little bluestem	10
				prairie cordgrass	5
				western wheatgrass	5
				Canada wildrye	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
122*:					
Cantle	Subirrigated (15-17") Southern Plains	Favorable	5,000	big bluestem	35
		Normal	4,500	willow	15
		Unfavorable	3,500	Indiangrass	10
				little bluestem	10
				prairie cordgrass	5
				western wheatgrass	5
				Canada wildrye	5
Merden, saline	Saline Subirrigated (15-17") Southern Plains	Favorable	4,500	alkali sacaton	45
		Normal	4,000	western wheatgrass	10
		Unfavorable	3,000	inland saltgrass	10
				fourwing saltbush	10
				alkali bluegrass	5
				Nuttall's alkaligrass	5
123*:					
Cathedral	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				western wheatgrass	5
				winterfat	5
Boyle	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				black sagebrush	5
				western wheatgrass	5
				winterfat	5
124*:					
Chalkcreek Family	Subirrigated (15-17") Southern Plains	Favorable	5,000	big bluestem	35
		Normal	4,500	Indiangrass	10
		Unfavorable	3,500	little bluestem	10
				prairie cordgrass	5
				western wheatgrass	5
				Canada wildrye	5
				willow	5
125*:					
Chalkcreek	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Tieside	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				needleandthread	10
				blue grama	5
126:					
Chivington	Clayey (15-17") Southern Plains	Favorable	1,700	western wheatgrass	40
		Normal	1,300	green needlegrass	25
		Unfavorable	600	winterfat	10
				blue grama	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production Kind of year	Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
127:					
Cowestglen	Lowland (15-17") Southern Plains	Favorable	3,000	needleandthread	20
		Normal	2,500	western wheatgrass	20
		Unfavorable	1,800	eastern cottonwood	15
				Indian ricegrass	10
				little bluestem	10
				Canada wildrye	5
				prairie junegrass	5
				silver sagebrush	5
128*:					
Dalecreek	Subirrigated (15-19") Foothills and Mountains Southeast	Favorable	4,500	basin wildrye	40
		Normal	4,000	tufted hairgrass	15
		Unfavorable	3,300	slender wheatgrass	10
				western wheatgrass	10
				shrubby cinquefoil	5
				willow	5
Kovich, cool	Subirrigated (15-19") Foothills and Mountains Southeast	Favorable	4,500	basin wildrye	40
		Normal	4,000	tufted hairgrass	15
		Unfavorable	3,300	slender wheatgrass	10
				western wheatgrass	10
				shrubby cinquefoil	5
129*:					
Dix	Gravelly (15-17") Southern Plains	Favorable	900	little bluestem	30
		Normal	600	bluebunch wheatgrass	25
		Unfavorable	400	Indian ricegrass	10
				needleandthread	10
				western wheatgrass	10
				yucca	5
Altvan	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
130:					
Embry	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
131:					
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
132*:					
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
132*:					
Weed	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
133*:					
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Weed	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Trimad	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
134*:					
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Ipson	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
136:					
Haverson	Loamy Overflow (15-17") Southern Plains	Favorable	3,000	western wheatgrass	25
		Normal	2,000	big bluestem	20
		Unfavorable	1,500	green needlegrass	10
				little bluestem	10
				needleandthread	10
				silver sagebrush	5
137*:					
Ipson	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production Kind of year	Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
137*:					
Breece, dry	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
138*:					
Ipson	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
139*:					
Ipson	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Rock outcrop.					
140*:					
Ipson	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
Pinelli	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Rock outcrop.					

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
141*:					
Ipson	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
Trimad	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
142, 143:					
Manter	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
144*:					
Manter	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
Treon	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
145:					
Merden	Saline Subirrigated (15-17") Southern Plains	Favorable	4,500	alkali sacaton	45
		Normal	4,000	western wheatgrass	10
		Unfavorable	3,000	inland saltgrass	10
				fourwing saltbush	10
				alkali bluegrass	5
				Nuttall's alkaligrass	5
146*:					
Merden, cool	Subirrigated (15-17") Southern Plains	Favorable	5,000	big bluestem	35
		Normal	4,500	willow	15
		Unfavorable	3,500	Indiangrass	10
				little bluestem	10
				western wheatgrass	5
				prairie cordgrass	5
Kovich	Wetland (15-17") Southern Plains	Favorable	6,000	prairie cordgrass	45
		Normal	5,500	bluejoint reedgrass	15
		Unfavorable	4,000	Nebraska sedge	15
				slim sedge	5
				northern reedgrass	5
				Baltic rush	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
147:					
Mitchell	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
148:					
Moskee	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	25
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	20
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
149:					
Nucla	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
150:					
Otero	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
151*:					
Otero	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
Valent	Sands (15-17") Southern Plains	Favorable	2,000	prairie sandreed	35
		Normal	1,500	sand bluestem	35
		Unfavorable	900	Indian ricegrass	5
				needleandthread	5
				sand sagebrush	5
Tassel	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				threadleaf sedge	5
				yucca	5
152, 153:					
Paoli	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
154:					
Peetz	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	20
		Normal	1,200	needleandthread	10
		Unfavorable	700	prairie sandreed	10
				sideoats grama	10
				blue grama	10
				yucca	5
155*:					
Peetz	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	20
		Normal	1,200	needleandthread	10
		Unfavorable	700	prairie sandreed	10
				sideoats grama	10
				blue grama	10
				yucca	5
Altvan	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
156:					
Pinelli	Clayey (15-17") Southern Plains	Favorable	1,700	western wheatgrass	40
		Normal	1,300	green needlegrass	25
		Unfavorable	600	winterfat	10
				blue grama	5
157*:					
Pinelli	Clayey (15-17") Southern Plains	Favorable	1,700	western wheatgrass	40
		Normal	1,300	green needlegrass	25
		Unfavorable	600	winterfat	10
				blue grama	5
Chivington	Clayey (15-17") Southern Plains	Favorable	1,700	western wheatgrass	40
		Normal	1,300	green needlegrass	25
		Unfavorable	600	winterfat	10
				blue grama	5
158:					
Poposhia	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
159*:					
Poposhia	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Blazon	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				blue grama	5
				needleandthread	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
160*:					
Poposhia	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Blazon, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Rock outcrop.					
161*:					
Poposhia	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Piezon	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
162*:					
Poposhia	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
Trimad	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
163*:					
Redthayne	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Tyzak, thin solum	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
163*:					
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
164*:					
Redthayne	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Tyzak	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Rock outcrop.					
166*:					
Rock outcrop.					
Blazon, thin solum	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
167*:					
Rock outcrop.					
Cathedral	Shallow Igneous (15-19") Foothills and Mountains Southeast	Favorable	1,200	bluebunch wheatgrass	25
		Normal	900	slimstem muhly	15
		Unfavorable	600	threetip sagebrush	15
				Griffith wheatgrass	5
				Idaho fescue	5
				western wheatgrass	5
				winterfat	5
168*:					
Taluce	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
Taluce, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Rock outcrop.					

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
169*:					
Taluce	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
Taluce, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Turnercrest	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
170*:					
Tieside, north slopes	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Rock outcrop.					
171*:					
Treon	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
Aberone	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
172*:					
Treon	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
Aberone	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
172*:					
Treon, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
173*:					
Treon, dry	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Aberone	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
174*:					
Treon, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Rock outcrop.					
Treon	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
175*:					
Treon, dry	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Bayard	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
176*:					
Trimad	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
176*:					
Blazon	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				needleandthread	5
				blue grama	5
177*:					
Trimad	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Blazon, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Rock outcrop.					
178*:					
Trimad	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Evanston	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
179*:					
Trimad, dry	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Poposhia, dry	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
180*:					
Trimad	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and and soil name	Range site	Total production Kind of year	Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
180*:					
Weed	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	30
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5
Blazon	Shallow Loamy (15-17") Southern Plains	Favorable	1,400	bluebunch wheatgrass	25
		Normal	1,100	little bluestem	20
		Unfavorable	600	western wheatgrass	15
				blue grama	5
				needleandthread	5
181*:					
Tyzak	Rocky Hills (15-17") Southern Plains	Favorable	1,000	true mountain mahogany	30
		Normal	800	needleandthread	20
		Unfavorable	450	bluebunch wheatgrass	15
				western wheatgrass	15
				little bluestem	5
Tyzak, thin solum	Very Shallow (15-17") Southern Plains	Favorable	600	bluebunch wheatgrass	35
		Normal	500	little bluestem	20
		Unfavorable	300	Indian ricegrass	15
				Rocky Mountain juniper	5
				needleandthread	5
Rock outcrop.					
190:					
Valent	Sands (15-17") Southern Plains	Favorable	2,000	prairie sandreed	35
		Normal	1,500	sand bluestem	35
		Unfavorable	900	Indian ricegrass	5
				needleandthread	5
				sand sagebrush	5
191*:					
Valent	Sands (15-17") Southern Plains	Favorable	2,000	prairie sandreed	35
		Normal	1,500	sand bluestem	35
		Unfavorable	900	Indian ricegrass	5
				needleandthread	5
				sand sagebrush	5
Treon	Shallow Sandy (15-17") Southern Plains	Favorable	1,500	little bluestem	35
		Normal	1,200	needleandthread	20
		Unfavorable	700	Indian ricegrass	10
				western wheatgrass	10
				yucca	5
				threadleaf sedge	5
192, 193:					
Vetal	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5

See footnote at end of table.

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
194:					
Vonalee	Sandy (15-17") Southern Plains	Favorable	1,800	needleandthread	35
		Normal	1,400	little bluestem	20
		Unfavorable	800	prairie sandreed	15
				thickspick wheatgrass	10
				Indian ricegrass	5
				silver sagebrush	5
195:					
Wages	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	35
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				little bluestem	5
				big sagebrush	5
				winterfat	5
196:					
Weed	Loamy (15-17") Southern Plains	Favorable	1,900	needleandthread	30
		Normal	1,400	western wheatgrass	20
		Unfavorable	700	blue grama	10
				big sagebrush	5
				little bluestem	5
				winterfat	5

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone I

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody species	Group 1			Group 1KW			Group 2			Group 2KW			Group 3		
	Precipitation			Precipitation			Precipitation			Precipitation			Precipitation		
	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers*:															
Austrian pine	---	17	22	---	---	---	**16	19	22	---	---	---	---	**16	22
Black Hills spruce	---	**16	22	**15	17	22	**15	18	22	**16	19	21	---	**16	22
Blue spruce	**12	16	22	---	16	22	**14	18	22	**12	18	22	---	16	22
Eastern redcedar	15	18	23	15	17	22	16	19	23	16	19	22	10	13	21
Ponderosa pine	**16	18	23	**16	18	23	**17	19	23	**17	20	23	**14	16	22
Rocky Mountain juniper	10	14	21	10	14	21	11	15	21	11	16	21	8	10	18
Scotch pine	---	**17	21	---	---	---	**13	18	21	---	---	---	---	**15	20
Deciduous trees:															
Boxelder	---	**16	21	---	---	---	**12	18	21	---	---	---	---	---	20
Golden willow	**20	**24	31	**20	**24	31	**20	26	31	**22	26	31	---	---	29
Green ash	**14	18	28	**14	17	27	**16	20	28	**15	18	27	**13	16	28
Hackberry	**14	18	26	**14	17	26	**16	20	26	**15	18	26	**14	18	24
Honeylocust	15	19	28	15	19	28	**17	21	28	16	20	28	14	17	26
Plains cottonwood	**29	**31	41	**29	31	41	**33	35	41	**31	33	41	---	---	41
Russian olive	15	18	24	16	18	24	17	20	24	17	20	24	13	15	23
Siberian crabapple	**11	13	19	---	---	---	**12	15	19	---	---	---	---	12	19
Siberian elm	**20	24	33	**20	24	33	**22	26	30	21	23	33	**18	23	33
Shrubs:															
American plum	---	**7	10	---	**7	10	**5	8	10	---	7	10	---	**7	10
Basin big sagebrush	---	---	---	---	---	---	---	---	---	---	---	---	4	5	---
Common chokecherry	**7	**7	11	**7	**7	11	**7	7	11	**7	7	11	**7	**8	11
Fourwing saltbush	2	---	---	2	---	---	2		---	2	---	---	2	---	---
Golden currant	---	**4	6	---	---	---	**4	**5	6-	---	---	---	---	**4	6
Greasewood	---	---	---	3	---	---	---	---	---	4	---		---	---	---
Lilac	**5	7	10	**5	7	10	**6	8	10	**6	8	10	**5	7	10
Nanking cherry	**3	5	8	---	---	---	**4	6	8	---	---	---	**3	5	8
Peking cotoneaster	**3	5	9	---	---	---	**4	6	9	---	---	---	**3	4	8
Redosier dogwood	---	4	8	---	---	---	4	5	8	---	---	---	---	---	8
Rubber rabbitbrush	---	---	---	3	---	---	---	---	---	---	---	---	---	---	---
Rugosa rose	2	4	6	---	---	---	3	5	6	---	---	---	3	4	6
Saskatoon serviceberry	---	**4	7	---	---	---	**4	5	7	---	---	---	---	---	5
Siberian peashrub	7	9	14	6	9	14	8	10	14	6	9	14	7	8	12
Silver buffaloberry	---	**7	12	---	**7	12	**6	8	12	**6	8	12	---	**7	11
Skunkbush sumac	3	5	9	3	5	9	4	6	9	4	6	9	3	5	9
Tatarian honeysuckle	6	8	11	6	8	11	7	9	11	6	8	11	5	7	11
Western sandcherry	2	3	3	---	---	---	2	3	3	---	---	---	2	3	3

See footnotes at end of table.

Table 8-Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone I--Continued

Woody species	Group 4			Group 4C			Group 4CK			Group 4K		
	Precipitation			Precipitation			Precipitation			Precipitation		
	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers*:												
Austrian pine	---	15	22	---	---	22	---	---	---	---	---	---
Black Hills spruce	---	---	20	---	---	20	---	---	19	---	---	19
Blue spruce	---	---	20	---	---	19	---	---	18	---	---	19
Eastern redcedar	10	12	20	8	11	20	8	11	19	9	12	19
Ponderosa pine	**12	15	22	**10	12	21	**10	12	20	**12	15	21
Rocky Mountain juniper	8	10	18	8	10	18	---	---	17	---	---	17
Scotch pine	---	---	20	---	---	20	---	---	---	---	---	---
Deciduous trees:												
Boxelder	---	---	19	---	---	19	---	---	---	---	---	---
Golden willow	---	---	29	---	---	29	---	---	27	---	---	27
Green ash	**13	15	28	**10	12	25	**10	12	23	**12	14	26
Hackberry	**14	18	24	**12	16	23	**11	15	22	**13	17	23
Honeylocust	13	16	26	12	14	24	11	13	22	12	15	24
Plains cottonwood	---	---	41	---	---	41	---	---	39	---	---	39
Russian olive	11	14	22	9	11	22	8	11	21	10	13	21
Siberian crabapple	---	12	19	---	11	19	---	---	---	---	---	---
Siberian elm	**17	21	33	**15	19	31	---	**13	29	**15	19	29
Shrubs:												
American plum	---	**7	10	---	**7	10	---	6	10	---	---	10
Basin big sagebrush	---	---	---	---	---	---	---	---	---	---	---	---
Common chokecherry	**7	8	11	**7	8	11	---	7	11	---	---	11
Fourwing saltbush	2	---	---	2	---	---	2	2	---	2	---	---
Golden currant	---	**4	6	---	---	6	---	---	6	---	---	6
Greasewood	---	---	---	---	---	---	---	---	---	---	---	---
Lilac	**5	7	10	**4	5	9	**4	5	9	**5	7	10
Nanking cherry	**3	5	8	**3	5	8	---	---	---	---	---	---
Peking cotoneaster	**3	4	8	---	4	8	---	---	---	---	---	---
Redosier dogwood	---	---	8	---	---	7	---	---	---	---	---	---
Rubber rabbitbrush	2	---	---	2	---	---	2	---	---	---	---	---
Rugosa rose	3	4	6	---	3	5	---	---	---	---	---	---
Saskatoon serviceberry	---	---	5	---	---	5	---	---	---	---	---	---
Siberian peashrub	6	7	12	4	5	12	4	5	11	5	6	11
Silver buffaloberry	---	**7	10	---	---	10	---	---	10	---	7	10
Skunkbush sumac	3	5	9	3	4	8	3	4	8	3	5	9
Tatarian honeysuckle	5	7	11	4	6	11	4	6	11	3	5	11
Western sandcherry	2	3	3	---	---	3	---	---	---	---	---	---

See footnotes at end of table.

Table 8.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone I--Continued

Woody species	Group 5			Group 5K			Group 5KK			Group 6		
	Precipitation			Precipitation			Precipitation			Precipitation		
	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers*:												
Austrian pine	---	**16	22	---	---	---	---	---	---	---	---	13
Black Hills spruce	---	---	20	---	---	20	---	---	19	---	---	16
Blue spruce	---	---	21	---	---	21	---	---	20	---	---	17
Eastern redcedar	10	13	20	8	10	20	7	8	19	**6	**8	16
Ponderosa pine	**13	15	22	**10	13	22	**8	11	18	**8	**10	18
Rocky Mountain juniper	8	10	17	8	10	17	7	8	13	**6	**10	14
Scotch pine	---	**15	20	---	---	---	---	---	---	---	**11	16
Deciduous trees:												
Boxelder	---	---	20	---	---	---	---	---	---	---	---	16
Golden willow	---	---	29	---	---	---	---	---	---	---	---	---
Green ash	**12	15	27	**11	13	28	**9	11	22	---	**11	22
Hackberry	---	14	24	---	---	25	---	---	20	---	---	19
Honeylocust	12	15	26	11	14	28	9	12	22	---	**11	21
Plains cottonwood	---	---	41	---	---	41	---	---	33	---	---	28
Russian olive	11	14	23	9	11	23	8	9	19	---	**9	18
Siberian crabapple	---	12	19	---	---	---	---	---	---	---	---	15
Siberian elm	**17	22	33	**16	20	33	**13	16	27	**12	**15	26
Shrubs:												
American plum	---	**7	10	---	---	10	---	---	8	---	---	8
Basin big sagebrush	4	---	---	3	---	---	3	---	---	3	4	---
Common chokecherry	**6	8	11	---	7	11	6	9	9	---	**6	9
Fourwing saltbush	2	---	---	2	2	---	2	---	---	2	2	---
Golden currant	---	---	6	---	---	---	---	---	---	---	---	5
Greasewood	---	---	---	3	---	---	3	---	---	---	---	---
Lilac	**5	6	10	**4	5	10	**4	5	10	---	**4	7
Nanking cherry	---	**4	8	---	---	---	---	---	---	---	---	6
Peking cotoneaster	---	**4	8	---	---	---	---	---	---	---	---	7
Redosier dogwood	---	---	8	---	---	---	---	---	---	---	---	6
Rubber rabbitbrush	---	---	---	2	---	---	2	2	---	2	3	---
Rugosa rose	2	3	6	---	---	---	---	---	---	**2	**3	5
Saskatoon serviceberry	---	---	5	---	---	5	---	---	4	---	---	4
Siberian peashrub	5	6	12	4	6	12	3	5	10	**4	**5	9
Silver buffaloberry	---	**6	11	---	**6	11	---	**6	10	---	**4	9
Skunkbush sumac	3	5	8	3	5	8	3	5	8	---	---	7
Tatarian honeysuckle	5	7	11	4	6	11	4	6	11	---	**5	9
Western sandcherry	2	3	3	---	---	---	---	---	---	---	---	3

See footnotes at end of table.

Table 8.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone I--Continued

Woody species	Group 6D			Group 6DK			Group 6G			Group 6GK		
	Precipitation			Precipitation			Precipitation			Precipitation		
	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers*:												
Austrian pine	---	**13	22	---	---	---	---	---	16	---	---	---
Black Hills spruce	---	---	20	---	---	18	---	---	20	---	---	18
Blue spruce	---	---	21	---	---	19	---	---	21	---	---	19
Eastern redcedar	8	11	20	7	10	18	8	10	20	7	9	18
Ponderosa pine	**11	13	22	**11	13	22	**10	13	22	**10	13	22
Rocky Mountain juniper	8	10	18	8	10	18	8	10	18	8	10	18
Scotch pine	---	13	20	---	---	---	---	13	20	---	---	---
Deciduous trees:												
Boxelder	---	---	20	---	---	---	---	---	20	---	---	---
Golden willow	---	---	29	---	---	29	---	---	---	---	---	---
Green ash	**11	14	28	**10	13	25	---	**13	28	---	12	26
Hackberry	---	12	25	---	11	23	---	---	24	---	---	22
Honeylocust	14	17	27	14	17	27	---	13	26	---	13	26
Plains cottonwood	---	---	35	---	---	35	---	---	35	---	---	35
Russian olive	11	14	24	11	24	24	10	13	23	10	13	23
Siberian crabapple	---	**12	19	---	---	---	---	---	19	---	---	---
Siberian elm	17	21	33	17	21	33	**15	20	33	**15	20	33
Shrubs:												
American plum	---	---	10	---	---	10	---	---	10	---	---	10
Basin big sagebrush	3	4	---	3	4	---	3	4	---	3	4	---
Common chokecherry	---	**7	11	---	**7	11	---	**7	11	---	**7	11
Fourwing saltbush	2	2	---	2	---	---	2	2	---	2	2	---
Golden currant	---	---	6	---	---	---	---	---	6	---	---	---
Greasewood	---	---	---	---			---	---	---	---	---	---
Lilac	---	**5	9	---	**5	9	---	**5	9	---	**5	9
Nanking cherry	---	**4	8	---	---	---	---	---	7	---	---	---
Peking cotoneaster	---	**4	8	---	---	---	---	**4	8	---	---	---
Redosier dogwood	---	---	7	---	---	---	---	---	7	---	---	---
Rubber rabbitbrush	3	3	---	---	---	---	2	3	---	2	3	6
Rugosa rose	2	3	6	---	---	---	2	3	6	---	---	---
Saskatoon serviceberry	---	---	5	---	---	---	---	---	5	---	---	---
Siberian peashrub	5	7	12	4	6	11	5	6	12	**4	**5	11
Silver buffaloberry	---	**7	11	**7	11	11	---	**5	11	---	5	11
Skunkbush sumac	**3	5	8	**3	5	8	---	3	8	---	3	8
Tatarian honeysuckle	5	7	11	5	7	11	---	6	11	---	6	11
Western sandcherry	---	2	3	---	---	---	---	2	3	---	---	---

See footnotes at end of table.

Table 8.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone I--Continued

Woody species	Group 6GKK: Precipitation 10-14"	Group 6GKK: Precipitation 15-19"	Group 6GKK: Irrigated	Group 6K: Precipitation 10-14"	Group 6K: Precipitation 15-19"	Group 6K: Irrigated	Group 6KK: Precipitation 10-14"	Group 6KK: Precipitation 15-19"	Group 6KK: Irrigated	Group 7: Precipitation 10-14"	Group 7: Precipitation 15-19"	Group 7: Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers*:												
Austrian pine	---	---	---	---	---	13	---	---	---	---	**12	22
Black Hills spruce	---	---	14	---	---	14	---	---	15	---	---	20
Blue spruce	---	---	15	---	---	16	---	---	16	---	---	21
Eastern redcedar	6	7	14	**6	**7	15	**5	8	15	**7	9	20
Ponderosa pine	**8	11	17	**8	**10	17	**8	10	17	---	**11	22
Rocky Mountain juniper	7	8	14	**6	**10	14	**5	7	14	**6	8	18
Scotch pine	---	---	---	---	---	---	---	---	---	---	**12	20
Deciduous trees:												
Boxelder	---	---	---	---	---	---	---	---	---	---	---	20
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---
Green ash	---	10	21	---	**11	21	---	11	22	---	12	28
Hackberry	---	---	18	---	---	18	---	9	20	---	---	24
Honeylocust	---	11	21	---	**11	21	---	11	21	---	13	26
Plains cottonwood	---	---	28	---	---	28	---	---	28	---	---	30
Russian olive	8	8	18	---	**8	18	---	11	19	---	**13	23
Siberian crabapple	---	---	---	---	---	---	---	---	---	---	---	19
Siberian elm	**13	17	26	**12	**15	26	**11	14	25	---	16	29
Shrubs:												
American plum	---	---	8	---	---	8	---	---	7	---	---	10
Basin big sagebrush	2	3	---	3	4	---	2	2	---	---	---	---
Common chokecherry	---	---	9	---	**6	9	---	---	8	---	---	11
Fourwing saltbush	2	2	---	2	2	---	2	2	---	---	---	---
Golden currant	---	---	---	---	---	---	---	---	---	---	---	6
Greasewood	---	---	---	---	---	---			---	---	---	---
Lilac	---	**5	9	---	**4	7	---	**4	8	---	**5	9
Nanking cherry	---	---	---	---	---	---	---	---	---	---	---	7
Peking cotoneaster	---	---	---	---	---	---	---	---	---	---	---	8
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	7
Rubber rabbitbrush	2	2	5	2	3	---	2	3	---	**2	3	---
Rugosa rose	---	---	---	---	---	---	---	---	---	**2	3	6
Saskatoon serviceberry	---	---	---	---	---	---	---	---	---	---	---	5
Siberian peashrub	**3	**4	9	**3	**4	9	---	**4	9	**4	6	12
Silver buffaloberry	---	**4	9	---	**4	9		**4	9	---	---	11
Skunkbush sumac	---	3	8	---	3	7	---	---	7	---	---	---
Tatarian honeysuckle	---	6	11	---	**5	9	---	**5	8	---	5	11
Western sandcherry	---	---	---	---	---	3	---	---	3	---	2	3

See footnotes at end of table.

Table 8.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone I--Continued

Woody species	Group 8			Group 8K			Group 9C			Group 9L			Group 9W		
	Precipitation			Precipitation			Precipitation			Precipitation			Precipitation		
	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated	10-14"	15-19"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers*:															
Austrian pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Black Hills spruce	---	---	21	---	---	17	---	---	---	---	---	---	---	---	---
Blue spruce	---	---	21	---	---	17	---	---	---	---	---	---	---	---	---
Eastern redcedar	8	10	20	6	8	16	---	**6	17	---	**7	17	---	10	20
Ponderosa pine	**11	13	22	**10	12	20	**8	10	21	**9	11	21	---	---	---
Rocky Mountain juniper	8	10	17	8	10	18	**4	5	15	**5	6	15	**7	9	16
Scotch pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Deciduous trees:															
Boxelder	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Green ash	11	13	30	9	11	24	---	**10	24	---	**11	24	---	16	27
Hackberry	---	---	26	---	---	21	---	---	---	---	---	---	---	---	---
Honeylocust	11	14	29	9	12	24	---	---	---	---	---	---	14	17	27
Plains cottonwood	---	---	41	---	---	33	---	---	35	---	---	35	---	27	41
Russian olive	9	11	22	9	11	22	7	8	22	8	9	22	13	16	23
Siberian crabapple	---	---	---	---	---	---	---	---	---	8	---	---	---	---	---
Siberian elm	17	20	33	15	18	31	**9	11	26	**10	12	26	**10	13	29
Shrubs:															
American plum	---	---	10	---	---	8	---	---	---	---	---	---	---	---	---
Basin big sagebrush	3	---	---	2	---	---	---	---	---	4	---	---	---	---	---
Common chokecherry	---	7	11	---	6	9	---	---	---	---	---	---	---	---	---
Fourwing saltbush	2	---	---	2	---	---	---	---	---	3	---	---	2	2	---
Golden currant	---	---	---	---	---	---	---	---	---	---	---	---	3	4	---
Greasewood	---	---	---	---	---	---	---	---	---	3	---	---	3	2	---
Lilac	4	5	10	4	5	10	---	4	10	---	5	10	**5	6	10
Nanking cherry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Peking cotoneaster	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubber rabbitbrush	2	---	---	2	---	---	---	---	---	3	---	---	2	3	---
Rugosa rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Saskatoon serviceberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Siberian peashrub	5	6	12	4	5	10	3	4	10	4	5	10	5	8	12
Silver buffaloberry	---	6	12	---	6	12	---	4	11	---	5	11	---	7	11
Skunkbush sumac	3	5	8	3	5	9	---	3	9	3	4	9	3	5	9
Tatarian honeysuckle	5	7	11	5	7	11	3	4	11	4	5	11	6	7	11
Western sandcherry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

* New plantings in areas that are prone to high wind need protection from the wind during the 3- to 5-year establishment period. A midwinter watering is also recommended to prevent foliar desiccation.

** Supplemental water is needed during the 3- to 5-year establishment period.

Table 9.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone III

(Dashes indicate that the species is not recommended for planting on the soils in the group.)

Woody species	Group 1				Group 1KW				Group 2				Group 2KW				Group 3			
	Precipitation				Precipitation				Precipitation				Precipitation				Precipitation			
	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers:																				
Blue spruce	*14	16	20	22	*13	16	20	22	*15	17	21	22	*14	17	21	22	---	16	18	22
Douglas fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20	25	26
Engelmann spruce	*14	16	25	26	---	---	---	---	*15	17	26	26	---	---	---	---	---	16	18	22
Lodgepole pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20	25	26
Ponderosa pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	*12	16	18	24
Rocky Mountain juniper	*10	14	18	21	*10	14	18	21	-	---	---	---	-	---	---	---	9	10	12	20
Scotch pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15	18	22
Subalpine fir	---	*12	15	15	---	---	---	---	*12	*13	15	15	---	---	---	---	---	---	13	13
White fir	*14	17	22	26	---	---	---	---	*15	18	23	26	---	---	---	---	---	---	---	---
Deciduous trees:																				
Boxelder	---	16	18	22	---	---	---	---	*14	17	19	22	---	---	---	---	---	14	16	22
Golden willow	*21	24	26	32	*19	23	26	32	*22	25	27	32	*21	24	27	32	---	---	---	32
Green ash	14	18	22	30	14	18	22	30	15	19	23	30	15	19	23	30	12	16	18	30
Narrowleaf cottonwood	*22	27	36	42	---	---	---	---	*25	29	38	42	---	---	---	---	---	---	---	38
Plains cottonwood	*22	27	36	42	*20	25	36	42	*25	29	38	42	*23	27	38	42	---	---	---	35
Russian olive	15	18	22	25	15	18	20	25	16	19	23	25	16	19	23	25	13	15	16	25
Siberian crabapple	*11	12	15	19	---	---	---	---	*12	13	16	19	---	---	---	---	---	12	15	19
Siberian elm	*20	27	28	36	*20	27	28	35	*22	29	30	36	*22	29	30	35	*20	26	28	35
White willow	*21	24	26	32	*19	23	26	32	*23	26	28	32	*23	26	28	32	---	---	---	32
Shrubs:																				
American plum	---	*6	7	11	---	*6	7	11	*4	*7	7	11	*4	*7	7	11	---	*6	7	11
Basin big sagebrush	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Common chokecherry	*7	8	8	12	*7	8	8	12	*8	9	9	12	*8	9	9	12	*7	8	9	12
Common snowberry	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Fourwing saltbush	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Golden currant	---	*4	4	4	---	---	---	---	*4	*4	4	4	---	---	---	---	---	4	4	4
Greasewood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lilac	*4	6	6	10	*4	6	6	10	*5	7	7	10	*5	7	7	10	*4	6	7	10
Redosier dogwood	---	---	6	8	---	---	---	---	---	*6	7	8	---	---	---	---	---	---	5	6
Rocky Mountain maple	---	7	9	10	---	---	---	---	*7	8	9	10	---	---	---	---	---	---	---	---
Rubber rabbitbrush	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rugosa rose	3	4	4	4	3	4	4	4	*4	4	4	4	*4	4	4	4	4	4	4	4
Saskatoon serviceberry	---	4	4	4	---	---	---	---	*4	4	4	4	---	---	---	---	---	4	4	5
Siberian peashrub	5	7	7	10	5	7	7	10	6	8	8	10	6	8	8	10	5	7	7	9
Silver buffaloberry	---	*7	9	11	---	*7	9	11	*5	*8	9	11	*5	8	9	11	---	*7	8	11
Skunkbush sumac	3	5	6	7	3	5	6	7	4	6	6	7	4	6	6	7	3	5	6	7
Tatarian honeysuckle	5	6	7	11	5	6	7	11	6	7	8	11	6	7	8	11	5	7	8	11
Woods rose	3	4	4	4	3	4	4	4	---	4	4	4	4	4	4	4	4	---	---	---

See footnote at end of table.

Table 9.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone III--Continued

Woody species	Group 4				Group 4C				Group 4CK				Group 4K			
	Precipitation				Precipitation				Precipitation				Precipitation			
	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers:																
Blue spruce	---	14	17	22	---	---	16	20	---	---	15	19	---	13	16	21
Douglas fir	---	16	20	26	---	---	---	---	---	---	---	---	---	---	---	---
Engelmann spruce	---	14	16	22	---	---	17	20	---	---	---	---	---	---	---	---
Lodgepole pine	---	16	20	26	---	---	---	---	---	---	---	---	---	---	---	---
Ponderosa pine	*12	15	17	24	*10	12	14	22	*9	11	13	21	*11	14	16	23
Rocky Mountain juniper	9	11	13	20	9	10	12	20	9	10	12	20	9	11	13	20
Scotch pine	---	---	15	22	---	---	---	20	---	---	---	---	---	---	---	---
Subalpine fir	---	---	12	12	---	---	---	---	---	---	---	---	---	---	---	---
White fir	---	---	12	12	---	---	---	---	---	---	---	---	---	---	---	---
Deciduous trees:																
Boxelder	---	*13	15	22	---	---	---	20	---	---	---	---	---	---	---	---
Golden willow	---	---	---	32	---	---	---	28	---	---	---	26	---	---	---	30
Green ash	13	15	17	30	11	12	14	27	10	11	13	25	12	14	16	28
Narrowleaf cottonwood	---	---	---	35	---	---	---	32	---	---	---	---	---	---	---	---
Plains cottonwood	---	---	---	36	---	---	---	33	---	---	---	33	---	---	---	36
Russian olive	11	13	16	25	10	11	13	22	10	11	13	25	11	13	16	22
Siberian crabapple	---	13	16	20	---	12	15	19	---	---	---	---	---	---	---	---
Siberian elm	*19	24	26	36	*19	21	24	32	*19	21	24	32	*19	24	26	36
White willow	---	---	---	32	---	---	---	27	---	---	---	25	---	---	---	30
Shrubs:																
American plum	---	*6	7	11	---	*6	6	9	---	*6	6	9	---	*6	7	11
Basin big sagebrush	---	---	---	---	2	3	---	---	2	3	---	---	---	---	---	---
Common chokecherry	*7	8	8	12	*7	8	8	11	*7	8	8	11	*7	8	8	12
Common snowberry	3	3	3	3	---	---	---	---	---	---	---	---	3	3	3	3
Fourwing saltbush	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Golden currant	---	3	4	4	---	3	3	4	---	---	---	---	---	---	---	4
Greasewood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lilac	*4	6	7	10	*4	5	6	10	*4	5	6	10	*4	6	7	10
Redosier dogwood	---	---	6	7	---	---	---	7	---	---	---	---	---	---	---	7
Rocky Mountain maple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubber rabbitbrush	---	---	---	---	2	3	---	---	2	3	3	---	---	---	---	---
Rugosa rose	3	4	4	4	---	3	3	4	---	3	3	4	3	4	4	4
Saskatoon serviceberry	---	---	4	5	---	---	---	---	---	---	---	---	---	---	---	5
Siberian peashrub	6	7	8	9	4	5	7	8	---	---	---	---	---	---	---	---
Silver buffaloberry	---	*7	9	11	---	*5	7	11	---	*5	8	11	---	*7	9	11
Skunkbush sumac	4	6	6	7	3	4	5	6	3	4	5	6	4	6	6	7
Tatarian honeysuckle	5	6	9	11	4	6	8	11	4	6	8	11	5	6	9	11
Woods rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 9.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone III--Continued

Woody species	Group 5				Group 5K				Group 5KK				Group 6			
	Precipitation				Precipitation				Precipitation				Precipitation			
	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers:																
Blue spruce	---	16	20	22	---	---	16	20	---	---	16	20	---	---	11	14
Douglas fir	---	---	18	24	---	---	---	---	---	---	---	---	---	---	---	---
Engelmann spruce	---	17	21	24	---	---	---	---	---	---	---	---	---	---	11	14
Lodgepole pine	---	17	22	26	---	---	---	---	---	---	---	---	---	---	13	18
Ponderosa pine	*12	17	19	24	*10	12	14	22	*10	12	14	22	*8	*11	13	18
Rocky Mountain juniper	9	11	13	18	9	10	12	17	9	10	12	17	*7	*8	9	14
Scotch pine	---	---	18	22	---	---	---	---	---	---	---	---	---	---	---	17
Subalpine fir	---	---	13	13	---	---	---	---	---	---	---	---	---	---	---	---
White fir	---	---	18	24	---	---	---	---	---	---	---	---	---	---	---	18
Deciduous trees:																
Boxelder	---	---	16	20	---	---	---	---	---	---	---	---	---	---	---	18
Golden willow	---	---	---	25	---	---	---	25	---	---	---	25	---	---	---	---
Green ash	12	16	18	26	11	14	16	26	10	12	14	26	---	*9	13	21
Narrowleaf cottonwood	---	---	---	33	---	---	---	31	---	---	---	31	---	---	---	---
Plains cottonwood	---	---	---	33	---	---	---	31	---	---	---	31	---	---	---	26
Russian olive	12	14	18	25	11	13	17	25	10	12	16	25	*8	*9	13	19
Siberian crabapple	---	12	14	18	---	---	---	---	---	---	---	---	---	---	---	---
Siberian elm	*18	24	26	33	*17	21	24	31	*17	21	24	31	---	*15	19	23
White willow	---	---	---	27	---	---	---	27	---	---	---	27	---	---	---	---
Shrubs:																
American plum	---	*5	7	10	---	---	---	11	---	---	---	11	---	---	6	7
Basin big sagebrush	2	3	---	---	3	3	---	---	3	3	---	---	2	2	2	---
Common chokecherry	*7	8	9	11	---	7	9	10	---	7	9	10	---	*7	7	9
Common snowberry	---	3	3	3	---	3	3	3	---	3	3	3	---	---	---	---
Fourwing saltbush	---	---	---	---	2	2	---	---	2	2	---	---	---	---	---	---
Golden currant	---	*3	4	4	---	---	---	---	---	---	---	---	---	---	3	3
Greasewood	---	---	---	---	3	3	---	---	3	3	---	---	---	---	---	---
Lilac	*5	6	7	9	*5	6	7	9	*5	6	7	9	---	*3	5	7
Redosier dogwood	---	---	6	6	---	---	---	---	---	---	---	---	---	---	---	---
Rocky Mountain maple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubber rabbitbrush	---	---	---	---	2	---	---	---	2	---	---	---	---	---	---	---
Rugosa rose	3	4	4	4	4	---	---	---	4	---	---	---	---	---	3	3
Saskatoon serviceberry	---	---	4	5	---	---	---	---	---	---	---	---	---	---	3	5
Siberian peashrub	6	7	8	9	6	7	7	9	6	7	7	9	*4	*5	5	7
Silver buffaloberry	---	*7	8	11	---	*6	8	11	---	*6	8	11	---	*5	6	8
Skunkbush sumac	3	5	6	6	4	5	5	6	4	5	5	6	---	*3	5	6
Tatarian honeysuckle	4	6	8	11	5	7	8	11	5	7	8	11	*4	*6	6	9
Woods rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 9.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone III--Continued

Woody species	Group 6D				Group 6DK				Group 6G				Group 6GK			
	Precipitation				Precipitation				Precipitation				Precipitation			
	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers:																
Blue spruce	---	---	14	18	---	---	13	16	---	---	14	18	---	---	13	16
Douglas fir	---	---	18	20	---	---	---	---	---	---	18	20	---	---	---	---
Engelmann spruce	---	---	16	20	---	---	---	---	---	---	14	18	---	---	---	---
Lodgepole pine	---	16	19	25	---	---	---	---	---	---	16	22	---	---	---	---
Ponderosa pine	*10	14	15	20	*10	14	15	20	*10	14	15	20	9	12	14	18
Rocky Mountain juniper	9	11	13	18	8	10	12	18	9	11	13	18	9	10	12	18
Scotch pine	---	---	18	21	---	---	---	---	---	---	18	21	---	---	---	---
Subalpine fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
White fir	---	---	17	21	---	---	---	---	---	---	17	22	---	---	---	---
Deciduous trees:																
Boxelder	---	---	---	20	---	---	---	---	---	---	---	18	---	---	---	---
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Green ash	9	11	13	22	9	11	13	22	9	11	13	22	9	11	13	22
Narrowleaf cottonwood	---	---	---	30	---	---	---	30	---	---	---	30	---	---	---	30
Plains cottonwood	---	---	---	32	---	---	---	29	---	---	---	30	---	---	---	29
Russian olive	11	13	15	22	11	13	15	22	10	12	14	23	10	12	14	23
Siberian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Siberian elm	*16	20	24	29	*16	20	24	29	*16	20	24	29	*16	20	24	29
White willow	---	---	---	27	---	---	---	24	---	---	---	27	---	---	---	27
Shrubs:																
American plum	---	---	6	8	---	---	6	8	---	---	6	8	---	---	6	8
Basin big sagebrush	3	3	---	---	3	3	---	---	3	3	---	---	3	3	---	---
Common chokecherry	---	7	8	11	---	7	8	11	---	7	8	11	---	7	8	11
Common snowberry	---	2	3	3	---	2	3	3	---	---	---	---	---	---	---	---
Fourwing saltbush	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Golden currant	---	3	3	4	---	---	---	---	---	---	4	4	---	---	---	---
Greasewood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lilac	---	5	6	9	---	5	6	9	---	5	6	9	---	5	6	9
Redosier dogwood	---	---	6	8	---	---	---	---	---	---	6	8	---	---	---	---
Rocky Mountain maple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubber rabbitbrush	2	3	---	---	---	---	---	---	2	3	---	---	2	3	---	---
Rugosa rose	---	3	3	4	---	---	---	---	---	3	4	4	---	---	---	---
Saskatoon serviceberry	---	---	4	5	---	---	---	---	---	4	6	---	---	---	---	---
Siberian peashrub	*4	5	7	8	*4	5	7	8	*4	5	6	8	*4	5	6	8
Silver buffaloberry	---	*7	8	11	---	*7	8	11	---	*7	8	11	---	*7	8	11
Skunkbush sumac	*3	4	5	8	3	4	5	8	---	3	5	6	---	3	5	6
Tatarian honeysuckle	*5	7	8	11	*4	6	7	10	*5	7	8	11	*4	6	7	10
Woods rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 9.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone Iii--Continued

Woody species	Group 6GKK				Group 6K				Group 6KK				Group 7			
	Precipitation				Precipitation				Precipitation				Precipitation			
	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers:																
Blue spruce	---	---	---	14	---	---	11	14	---	---	---	---	---	13	15	19
Douglas fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Engelmann spruce	---	---	---	---	---	---	---	---	---	---	---	---	---	13	15	19
Lodgepole pine	---	---	---	---	---	---	---	---	---	---	---	---	---	13	15	20
Ponderosa pine	9	12	14	19	8	11	13	19	*8	11	13	18	*10	*13	17	22
Rocky Mountain juniper	8	9	11	17	7	8	9	14	7	8	9	14	*8	*9	11	16
Scotch pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	17	20
Subalpine fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	12
White fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	16	22
Deciduous trees:																
Boxelder	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14	19
Golden willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	25
Green ash	8	10	12	21	---	*9	11	20	---	*8	11	20	---	*10	14	23
Narrowleaf cottonwood	---	---	---	27	---	---	---	27	---	---	---	25	---	---	---	---
Plains cottonwood	---	---	---	26	---	---	---	26	---	---	---	25	---	---	---	26
Russian olive	9	11	13	22	8	10	14	20	8	10	12	20	---	*9	13	19
Siberian crabapple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Siberian elm	*15	19	23	28	---	15	20	25	---	15	20	25	---	*15	19	23
White willow	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	25
Shrubs:																
American plum	---	---	6	8	---	---	6	8	---	---	5	7	---	5	6	9
Basin big sagebrush	3	3	---	---	3	3	---	---	3	3	---	---	2	3	3	---
Common chokecherry	---	*6	7	10	---	*5	7	10	---	*5	7	10	*6	7	8	10
Common snowberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3	3
Fourwing saltbush	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Golden currant	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3	3
Greasewood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lilac	---	*4	6	8	---	*4	6	8	---	*4	6	8	*3	4	6	8
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rocky Mountain maple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubber rabbitbrush	2	3	---	---	2	3	---	---	2	3	---	---	---	---	---	---
Rugosa rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3	3
Saskatoon serviceberry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3	5
Siberian peashrub	*3	4	5	7	---	4	5	7	---	*4	5	7	*5	*6	6	7
Silver buffaloberry	---	*6	7	10	---	*6	8	10	---	*6	8	10	---	*6	7	10
Skunkbush sumac	---	*3	5	6	---	*3	5	6	---	*3	5	6	---	*4	4	6
Tatarian honeysuckle	*4	6	7	10	---	4	5	8	---	5	5	8	*4	*6	7	10
Woods rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 9.--Expected Heights of Selected Woody Species at Age 20, by Suitability Group, in Planting Zone Iii--Continued

Woody species	Group 8				Group 8K				Group 9C				Group 9L				Group 9W			
	Precipitation				Precipitation				Precipitation				Precipitation				Precipitation			
	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated	10-14"	15-19"	20+"	Irrigated
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
Conifers:																				
Blue spruce	---	14	16	21	---	---	16	21	---	---	---	---	---	---	---	---	---	---	---	---
Douglas fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Engelmann spruce	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lodgepole pine	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ponderosa pine	*11	12	17	22	*10	12	17	22	---	---	---	---	---	---	---	---	---	---	---	---
Rocky Mountain juniper	8	10	13	18	8	10	13	18	*7	8	9	16	*7	8	9	16	*8	9	10	16
Scotch pine	---	14	17	21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Subalpine fir	---	---	13	13	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
White fir	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Deciduous trees:																				
Boxelder	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Golden willow	---	---	---	27	---	---	---	26	---	---	---	23	---	---	---	23	---	---	23	28
Green ash	12	15	17	29	11	13	16	29	---	*11	14	26	---	*11	14	26	---	13	17	28
Narrowleaf cottonwood	---	---	---	32	---	---	---	32	---	---	---	30	---	---	---	30	---	---	---	33
Plains cottonwood	---	---	---	35	---	---	---	35	---	---	---	35	---	---	---	35	---	---	---	42
Russian olive	13	15	16	25	13	15	16	25	*9	12	16	24	*9	12	16	24	12	14	18	26
Siberian crabapple	---	12	15	19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Siberian elm	*18	24	28	33	*18	20	28	33	*15	20	22	28	*15	20	22	28	*16	22	24	30
White willow	---	---	---	30	---	---	---	28	---	---	---	27	---	---	---	27	---	---	27	30
Shrubs:																				
American plum	---	*6	7	11	---	*5	7	10	---	---	---	---	---	---	---	---	---	---	---	---
Basin big sagebrush	3	3	---	---	3	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Common chokecherry	*7	8	9	12	*7	8	9	12	---	---	---	---	---	---	---	---	---	---	---	---
Common snowberry	---	3	3	3	---	3	3	3	---	---	---	---	---	---	---	---	---	---	---	---
Fourwing saltbush	2	---	---	---	2	2	---	---	2	2	---	---	2	2	---	---	3	3	---	---
Golden currant	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Greasewood	---	---	---	---	---	---	---	---	2	4	---	---	2	4	---	---	3	4	---	---
Lilac	*5	6	7	10	*5	6	7	10	*5	6	7	10	*4	5	6	9	*5	6	8	10
Redosier dogwood	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rocky Mountain maple	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rubber rabbitbrush	2	---	---	---	2	3	---	---	2	2	---	---	2	2	---	---	2	2	---	---
Rugosa rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Saskatoon serviceberry	---	---	5	6	---	---	4	6	---	---	---	---	---	---	---	---	---	---	---	---
Siberian peashrub	6	7	8	9	5	6	7	9	---	---	---	---	---	---	---	---	---	---	---	---
Silver buffaloberry	---	*7	8	11	---	*5	7	10	---	7	8	11	---	*6	7	11	---	*6	7	11
Skunkbush sumac	3	5	6	7	3	5	6	7	---	5	6	7	---	5	6	7	---	5	6	7
Tatarian honeysuckle	5	7	8	11	5	7	8	11	4	5	6	10	4	5	6	10	4	5	6	10
Woods rose	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

* Supplemental water is needed during the 3- to 5-year establishment period.

Table 10.--Windbreak Suitability Groups and Planting Zones

Map symbol and soil name	Suitability group	Planting zone
100 Albinas	3	I
101 Altvan	6G	I
102:		
Altvan	6G	I
Dix	6	I
103, 104 Ascalon	3	I
105 Bayard	8	I
106 Bayard, wet	1KW	I
107:		
Bayard	8	I
Paoli	3	I
108:		
Blazon	10	III
Blazon, thin solum	10	III
Poposhia	8	III
109:		
Blazon	10	III
Chaperton	6DK	III
110:		
Blazon	10	III
Chaperton	6DK	III
Rock outcrop.		
111:		
Blazon	10	III
Trimad	5KK	III
112:		
Boyle	10	III
Alderon	6D	III
Cathedral	10	III
113:		
Boyle	10	III
Boyle, thin solum	10	III

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
114:		
Boyle, thin solum	10	III
Breece	5	III
Cathedral	10	III
115:		
Boyle, very stony	10	III
Boyle, thin solum	10	III
Lininger	6D	III
116:		
Boyle	10	III
Lininger	6D	III
Boyle, thin solum	10	III
117:		
Boyle	10	III
Rock outcrop.		
Cathedral	10	III
118:		
Boyle	10	III
Lininger	6D	III
119 Breece	5	III
120 Bresser	6G	I
121 Cantle	10	III
122:		
Cantle	10	I
Merden, saline	10	I
123:		
Cathedral	10	III
Boyle	10	III
124 Chalkcreek Family	1KW	III
125:		
Chalkcreek	8	III
Tieside	10	III
126 Chivington	4C	III

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
127 Cowestglen	5K	III
128:		
Dalecreek	1	III
Kovich, cool	1	III
129:		
Dix	6	I
Altvan	6G	I
130 Embry	5	I
131 Evanston	3	III
132:		
Evanston	5	III
Weed	3	III
133:		
Evanston	3	III
Weed	3	III
Trimad	5KK	III
134:		
Evanston	3	III
Ipson	5	III
135:		
Haverdad	6GK	I
Clarkelen	2KW	I
Kovich, warm	10	I
136 Haverson	8	I
137:		
Ipson	5	III
Breece, dry	5	III
Evanston	3	III
138:		
Ipson	5	III
Evanston	3	III
139:		
Ipson	5	III
Evanston	3	III
Rock outcrop.		

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
140:		
Ipson	5	III
Pinelli	4C	III
Rock outcrop.		
141:		
Ipson	5	III
Trimad	5KK	III
142, 143:		
Manter	3	I
144:		
Manter	3	I
Treon	10	I
145 Merden	10	I
146:		
Merden, cool	10	III
Kovich	10	III
147 Mitchell	8	I
148 Moskee	3	I
149 Nucla	8	I
150 Otero	8	I
151:		
Otero	8	I
Valent	7	I
Tassel	10	I
152 Paoli	3	I
153 Paoli	3	I
154 Peetz	6GKK	I
155:		
Peetz	6GKK	I
Altvan	6G	I

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
156	4C	III
Pinelli		
157:		
Pinelli	4C	III
Chivington	4	III
158	8	III
Poposhia		
159:		
Poposhia	8	III
Blazon	10	III
160:		
Poposhia	8	III
Blazon, thin solum	10	III
Rock outcrop.		
161:		
Poposhia	8	III
Piezon	6DK	III
162:		
Poposhia	8	III
Trimad	5KK	III
163:		
Redthayne	5	III
Tyzak, thin solum	10	III
Evanston	3	III
164:		
Redthayne	5	III
Tyzak	10	III
Rock outcrop.		
165	10	I
Riverwash		
166:		
Rock outcrop.		
Blazon, thin solum	10	III
167:		
Rock outcrop.		
Cathedral	10	III

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
168:		
Taluce	10	I
Taluce, thin solum	10	I
Rock outcrop.		
169:		
Taluce	10	I
Taluce, thin solum	10	I
Turnercrest	6DK	I
170:		
Tieside, north slopes	10	III
Rock outcrop.		
171:		
Treon	10	I
Aberone	5K	I
172:		
Treon	10	I
Aberone	5K	I
Treon, thin solum	10	I
173:		
Treon, dry	10	I
Aberone	5K	I
174:		
Treon, thin solum	10	I
Rock outcrop.		
Treon	10	I
175:		
Treon, dry	10	I
Bayard	8	I
176:		
Trimad	5KK	III
Blazon	10	III
177:		
Trimad	5KK	III
Blazon, thin solum	10	III
Rock outcrop.		
178:		
Trimad	5KK	III
Evanston	3	III

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
179:		
Trimad, dry	5KK	III
Poposhia, dry	8	III
180:		
Trimad	5KK	III
Weed	3	III
Blazon	10	III
181:		
Tyzak	10	III
Tyzak, thin solum	10	III
Rock outcrop.		
182:		
Urban land.		
Albinas	3	I
183:		
Urban land.		
Altvan	6G	I
184:		
Urban land.		
Ascalon	3	I
185:		
Urban land.		
Bayard	8	I
186:		
Urban land.		
Evanston	3	III
187:		
Urban land.		
Merden	10	I
188:		
Urban land.		
Poposhia	8	III
189:		
Urban land.		
Poposhia	8	III
Trimad	5KK	III
190 Valent	7	I

Table 10.--Windbreak Suitability Groups and Planting Zones--Continued

Map symbol and soil name	Suitability group	Planting zone
191:		
Valent	7	I
Treon	10	I
192, 193 Vetal	3	I
194 Vonalee	3	I
195 Wages	3	I
196 Weed	3	III

Table 11.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
100:					
Albinas	Slight	Slight	Moderate: slope	Slight	Slight
101:					
Altvan	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
102*:					
Altvan	Moderate: dusty	Moderate: dusty	Severe: slope	Moderate: dusty	Slight
Dix	Moderate: dusty, slope, small stones	Moderate: dusty, slope, small stones	Severe: slope, small stones	Moderate: dusty	Moderate: slope, small stones, droughty
103:					
Ascalon	Slight	Slight	Severe: slope	Slight	Slight
104:					
Ascalon	Slight	Slight	Moderate: slope	Slight	Slight
105:					
Bayard	Slight	Slight	Severe: slope	Slight	Slight
106:					
Bayard, wet	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
107*:					
Bayard	Slight	Slight	Moderate: slope, small stones	Slight	Slight
Paoli	Slight	Slight	Moderate: slope	Slight	Slight
108*:					
Blazon	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: erodes easily	Severe: depth to rock
Blazon, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: erodes easily	Severe: depth to rock
Poposhia	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Severe: erodes easily	Slight
109*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Moderate: dusty, slope	Severe: slope, depth to rock

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
109*:					
Chaperton	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope, depth to rock
110*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock
Chaperton	Severe: slope	Severe: slope	Severe: slope	Moderate: dusty, slope	Severe: slope
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: slope depth to rock
111*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: erodes easily, slope	Severe: slope, depth to rock
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
112*:					
Boyle	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones	Moderate: slope, dusty	Severe: slope, depth to rock
Alderon	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Moderate: slope	Severe: slope, depth to rock
113*:					
Boyle	Severe: depth to rock	Severe: depth to rock	Severe: small stones	Moderate: dusty	Severe: depth to rock
Boyle, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: small stones	Moderate: dusty	Severe: depth to rock
114*:					
Boyle, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: slope, small stones	Moderate: dusty	Severe: depth to rock
Breece	Slight	Slight	Moderate: small stones	Slight	Moderate: droughty
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
115*:					
Boyle, very stony	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, small stones	Severe: slope	Severe: large stones, slope, depth to rock

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
115*:					
Boyle, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones	Severe: slope	Severe: slope, depth to rock
Lininger	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
116*:					
Boyle	Severe: depth to rock	Severe: depth to rock	Severe: slope, small stones	Moderate: dusty	Severe: depth to rock
Lininger	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Boyle, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones	Severe: slope	Severe: slope, depth to rock
117*:					
Boyle	Severe: depth to rock	Severe: depth to rock	Severe: slope, small stones	Moderate: dusty	Severe: depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: depth to rock
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
118*:					
Boyle	Severe: depth to rock	Severe: depth to rock	Severe: slope, small stones	Moderate: dusty	Severe: depth to rock
Lininger	Slight	Slight	Moderate: slope, small stones, depth to rock	Slight	Moderate: depth to rock
119:					
Breece	Slight	Slight	Moderate: slope, small stones	Slight	Moderate: droughty
120:					
Bresser	Slight	Slight	Slight	Slight	Slight
121:					
Cantle	Severe: flooding, wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
122*:					
Cantle	Severe: flooding, wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Merden, saline	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
123*:					
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Moderate: slope	Severe: slope, depth to rock
Boyle	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones	Moderate: dusty, slope	Severe: slope, depth to rock
124*:					
Chalkcreek Family	Severe: flooding	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
125*:					
Chalkcreek	Moderate: dusty	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
Tieside	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Moderate: dusty	Severe: depth to rock
126:					
Chivington	Slight	Slight	Moderate: slope	Slight	Slight
127:					
Cowestglen	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
128*:					
Dalecreek	Severe: flooding	Slight	Moderate: slope, small stones	Slight	Slight
Kovich, cool	Severe: flooding, wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
129*:					
Dix	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: dusty, slope	Severe: slope
Altvan	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope
130:					
Embry	Slight	Slight	Severe: slope	Slight	Slight
131:					
Evanston	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
132*:					
Evanston	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope	Severe: slope
Weed	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
133*:					
Evanston	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope
Weed	Slight	Slight	Moderate: slope	Slight	Slight
Trimad	Moderate: slope, dusty	Moderate: slope, dusty	Severe: slope	Moderate: dusty	Moderate: slope, droughty
134*:					
Evanston	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
Ipson	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope
135*:					
Haverdad	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
Clarkelen	Severe: flooding	Moderate: wetness	Moderate: flooding, wetness	Slight	Moderate: flooding, droughty
Kovich, warm	Severe: flooding, wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
136:					
Haverson	Severe: flooding	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
137*:					
Ipson	Moderate: dusty, small stones	Moderate: dusty, small stones	Severe: small stones	Moderate: dusty	Moderate: small stones, droughty
Breece, dry	Slight	Slight	Moderate: small stones	Slight	Moderate: droughty
Evanston	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
138*:					
Ipson	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: dusty, slope	Severe: slope
Evanston	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope
139*:					
Ipson	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: dusty, slope	Severe: slope

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
139*:					
Evanston----------------	Moderate: dusty	Moderate: dusty	Severe: slope	Moderate: dusty	Slight
Rock outcrop-----------	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: depth to rock
140*:					
Ipson-------------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Pinelli-----------------	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope
Rock outcrop-----------	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: depth to rock
141*:					
Ipson-------------------	Severe: slope	Severe: slope	Severe: slope	Moderate: dusty, slope	Severe: slope
Trimad------------------	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
142:					
Manter------------------	Slight	Slight	Moderate: slope, small stones	Slight	Slight
143:					
Manter------------------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
144*:					
Manter------------------	Slight	Slight	Moderate: slope, small stones	Slight	Slight
Treon-------------------	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
145:					
Merden------------------	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness
146*:					
Merden, cool-----------	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness
Kovich------------------	Severe: flooding, wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
147:					
Mitchell----------------	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
148:					
Moskee------------------	Slight	Slight	Slight	Slight	Slight
149:					
Nucla-------------------	Moderate: dusty	Moderate: dusty	Moderate: dusty	Moderate: dusty	Slight
150:					
Otero-------------------	Slight	Slight	Moderate: slope	Slight	Slight
151*:					
Otero-------------------	Slight	Slight	Severe: slope	Slight	Slight
Valent------------------	Moderate: too sandy	Moderate: too sandy	Severe: slope	Moderate: too sandy	Moderate: droughty
Tassel------------------	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
152:					
Paoli-------------------	Slight	Slight	Slight	Slight	Slight
153:					
Paoli-------------------	Slight	Slight	Severe: slope	Slight	Slight
154:					
Peetz-------------------	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Slight	Moderate: small stones, droughty, slope
155*:					
Peetz-------------------	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Slight	Moderate: small stones, droughty, slope
Altvan------------------	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
156:					
Pinelli-----------------	Moderate: dusty	Moderate: dusty	Severe: slope	Moderate: dusty	Slight
157*:					
Pinelli-----------------	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Chivington--------------	Slight	Slight	Moderate: slope	Slight	Slight
158:					
Poposhia----------------	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Severe: erodes easily	Slight
159*:					
Poposhia----------------	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Severe: erodes easily	Moderate: slope

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
159*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: erodes easily	Severe: slope, depth to rock
160*:					
Poposhia	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Severe: erodes easily	Moderate: slope
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: erodes easily, slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
161*:					
Poposhia	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Severe: erodes easily	Slight
Piezon	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope, depth to rock	Moderate: dusty	Moderate: depth to rock
162*:					
Poposhia	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Severe: erodes easily	Slight
Trimad	Moderate: slope, dusty	Moderate: slope, dusty	Severe: slope	Moderate: dusty	Moderate: slope, droughty
163*:					
Redthayne	Moderate: dusty, small stones	Moderate: dusty, small stones	Severe: slope, small stones	Moderate: dusty	Moderate: small stones, droughty
Tyzak, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: slope, small stones, depth to rock	Slight	Severe: depth to rock
Evanston	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
164*:					
Redthayne	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: dusty, slope	Severe: slope
Tyzak	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: depth to rock

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
165*:					
Riverwash.					
166*:					
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope	Severe: slope, depth to rock
167*:					
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: depth to rock
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock
168*:					
Taluce	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
Taluce, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
Rock outcrop	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
169*:					
Taluce	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
Taluce, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
Turnercrest	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope, depth to rock
170*:					
Tieside, north slopes	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: depth to rock
171*:					
Treon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
171*:					
Aberone	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope, droughty
172*:					
Treon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
Aberone	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope, droughty
Treon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
173*:					
Treon, dry	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
Aberone	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
174*:					
Treon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
Treon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
175*:					
Treon, dry	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
Bayard	Slight	Slight	Severe: slope	Slight	Slight
176*:					
Trimad	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: erodes easily, slope	Severe: slope, depth to rock
177*:					
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: erodes easily, slope	Severe: slope, depth to rock

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
177*:					
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock
178*:					
Trimad	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, dusty	Severe: slope
Evanston	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Moderate: dusty	Moderate: slope
179*:					
Trimad, dry	Moderate: slope, dusty	Moderate: slope, dusty	Severe: slope	Moderate: dusty	Moderate: slope, droughty
Poposhia, dry	Moderate: dusty, slope	Moderate: dusty, slope	Severe: slope	Severe: erodes easily	Moderate: slope
180*:					
Trimad	Moderate: slope, dusty	Moderate: slope, dusty	Severe: slope	Moderate: dusty	Moderate: slope, droughty
Weed	Slight	Slight	Moderate: slope	Slight	Slight
Blazon	Severe: depth to rock	Severe: depth to rock	Severe: slope, small stones, depth to rock	Moderate: dusty	Severe: depth to rock
181*:					
Tyzak	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope	Severe: slope, depth to rock
Tyzak, thin solum	Severe: slope, small stones, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope, small stones, depth to rock	Severe: slope	Severe: slope, small stones, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Severe: depth to rock
182*:					
Urban land.					
Albinas	Slight	Slight	Moderate: slope	Slight	Slight
183*:					
Urban land.					
Altvan	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
184*:					
Urban land.					
Ascalon	Slight	Slight	Moderate: slope	Slight	Slight
185*:					
Urban land.					
Bayard	Slight	Slight	Severe: slope	Slight	Slight
186*:					
Urban land.					
Evanston	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
187*:					
Urban land.					
Merden	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness
188*:					
Urban land.					
Poposhia	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Severe: erodes easily	Slight
189*:					
Urban land.					
Poposhia	Moderate: dusty	Moderate: dusty	Severe: slope	Severe: erodes easily	Slight
Trimad	Moderate: slope, dusty	Moderate: slope, dusty	Severe: slope	Moderate: dusty	Moderate: slope, droughty
190:					
Valent	Moderate: too sandy	Moderate: too sandy	Moderate: slope, too sandy	Moderate: too sandy	Moderate: droughty
191*:					
Valent	Moderate: slope, too sandy	Moderate: slope, too sandy	Severe: slope	Moderate: too sandy	Moderate: slope, droughty
Treon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Moderate: slope	Severe: slope, depth to rock
192, 193:					
Vetal	Slight	Slight	Moderate: slope	Slight	Slight
194:					
Vonalee	Slight	Slight	Moderate: slope	Slight	Slight

See footnote at end of table.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
195:					
Wages------------------	Moderate: dusty	Moderate: dusty	Moderate: dusty, slope	Moderate: dusty	Slight
196:					
Weed-------------------	Slight	Slight	Moderate: slope	Slight	Slight

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
100:						
Albinas	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: low strength, shrink-swell	Slight
101:						
Altvan	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
102*:						
Altvan	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
Dix	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope, small stones, droughty
103:						
Ascalon	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
104:						
Ascalon	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: frost action, low strength, shrink-swell	Slight
105:						
Bayard	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
106:						
Bayard, wet	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
107*:						
Bayard	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
Paoli	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
108*:						
Blazon	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope, depth to rock	Moderate: low strength, depth to rock	Severe: depth to rock
Blazon, thin solum	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope, depth to rock	Moderate: depth to rock, low strength	Severe: depth to rock
Poposhia	Slight	Slight	Slight	Slight	Severe: low strength	Slight
109*:						
Blazon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
109*:						
Chaperton	Moderate: slope, depth to rock	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope, depth to rock	Severe: slope	Severe: low strength	Moderate: slope, depth to rock
110*:						
Blazon	Severe: slope, depth to rock	Severe: shrink-swell, slope	Severe: shrink-swell, slope, depth to rock	Severe: shrink-swell, slope	Severe: low strength, shrink-swell, slope	Severe: slope, depth to rock
Chaperton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength, slope	Severe: slope
Rock outcrop	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
111*:						
Blazon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
112*:						
Boyle	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Alderon	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
113*:						
Boyle	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: depth to rock
Boyle, thin solum	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: depth to rock
114*:						
Boyle, thin solum	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: depth to rock, slope	Severe: depth to rock
Breece	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: droughty
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
115*:						
Boyle, very stony	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: large stones, slope, depth to rock
Boyle, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Lininger	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
116*:						
Boyle	Severe: depth to rock	Moderate: depth to rock slope	Severe: depth to rock	Severe: slope	Moderate: depth to rock slope	Severe: depth to rock
Lininger	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Boyle, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
117*:						
Boyle	Severe: depth to rock	Moderate: depth to rock, slope	Severe: depth to rock	Severe: slope	Moderate: depth to rock, slope	Severe: depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
118*:						
Boyle	Severe: depth to rock	Moderate: depth to rock, slope	Severe: depth to rock	Severe: slope	Moderate: depth to rock, slope	Severe: depth to rock
Lininger	Moderate: depth to rock	Moderate: shrink-swell	Moderate: shrink-swell, depth to rock	Moderate: shrink-swell, slope	Moderate: frost action, shrink-swell	Moderate: depth to rock
119:						
Breece	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: droughty
120:						
Bresser	Severe: cutbanks cave	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: frost action, low strength, shrink-swell	Slight
121:						
Cantle	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, frost action, wetness	Severe: wetness

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
122*:						
Cantle	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, frost action, wetness	Severe: wetness
Merden, saline	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, low strength, wetness	Severe: flooding, wetness
123*:						
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
Boyle	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
124*:						
Chalkcreek Family	Moderate: wetness	Severe: flooding	Severe: flooding	Severe: flooding	Severe: low strength	Slight
125*:						
Chalkcreek	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight
Tieside	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope, depth to rock	Moderate: depth to rock, low strength	Severe: depth to rock
126:						
Chivington	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength, shrink-swell	Slight
127:						
Cowestglen	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
128*:						
Dalecreek	Moderate: wetness	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: shrink-swell, flooding	Slight
Kovich, cool	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: frost action, wetness	Severe: wetness
129*:						
Dix	Severe: slope, cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Altvan	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Moderate: slope
130:						
Embry	Slight	Slight	Slight	Moderate: slope	Slight	Slight

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
131:						
Evanston	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: frost action, shrink-swell	Slight
132*:						
Evanston	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Weed	Moderate: slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Moderate: low strength, shrink-swell, slope	Moderate: slope
133*:						
Evanston	Moderate: slope	Moderate: shrink-swell, slope	Moderate: slope	Severe: slope	Moderate: frost action, shrink-swell, slope	Moderate: slope
Weed	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell, slope	Moderate: shrink-swell, low strength	Slight
Trimad	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope, frost action	Moderate: droughty, slope
134*:						
Evanston	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell, slope	Moderate: frost action, low strength, shrink-swell	Slight
Ipson	Moderate: slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Moderate: frost action, shrink-swell, slope	Moderate: slope
135*:						
Haverdad	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
Clarkelen	Severe: wetness, cutbanks cave	Severe: flooding	Severe: flooding, wetness	Severe: flooding	Severe: flooding	Moderate: flooding, droughty
Kovich, warm	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, frost action, wetness	Severe: wetness
136:						
Haverson	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
137*:						
Ipson	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: small stones, droughty
Breece, dry	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: droughty

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
137*:						
Evanston	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: frost action, shrink-swell	Slight
138*:						
Ipson	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Evanston	Moderate: slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Moderate: frost action, shrink-swell, slope	Moderate: slope
139*:						
Ipson	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Evanston	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell, slope	Moderate: frost action, shrink-swell	Slight
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
140*:						
Ipson	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Pinelli	Moderate: too clayey, slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Moderate: low strength, shrink-swell, slope	Moderate: slope
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
141*:						
Ipson	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
142:						
Manter	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
143:						
Manter	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
144*:						
Manter	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
Treon	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: frost action, slope, depth to rock	Severe: depth to rock

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
145:						
Merden	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, low strength, wetness	Severe: flooding, wetness
146*:						
Merden, cool	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, low strength, wetness	Severe: flooding, wetness
Kovich	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: frost action, wetness	Severe: wetness
147:						
Mitchell	Slight	Slight	Slight	Slight	Slight	Slight
148:						
Moskee	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: frost action, shrink-swell	Slight
149:						
Nucla	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
150:						
Otero	Slight	Slight	Slight	Slight	Slight	Slight
151*:						
Otero	Slight	Slight	Slight	Moderate: slope	Slight	Slight
Valent	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
Tassel	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Moderate: slope, depth to rock	Moderate: slope, depth to rock	Severe: depth to rock
152:						
Paoli	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
153:						
Paoli	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
154:						
Peetz	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: droughty, small stones, slope
155*:						
Peetz	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: droughty, small stones slope

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
155*:						
Altvan	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: droughty
156:						
Pinelli	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell, slope	Moderate: low strength, shrink-swell	Slight
157*:						
Pinelli	Moderate: slope, too clayey	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Moderate: low strength, shrink-swell, slope	Moderate: slope
Chivington	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength, shrink-swell	Slight
158:						
Poposhia	Slight	Slight	Slight	Slight	Severe: low strength	Slight
159*:						
Poposhia	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope
Blazon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
160*:						
Poposhia	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
161*:						
Poposhia	Slight	Slight	Slight	Slight	Severe: low strength	Slight
Piezon	Moderate: depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Severe: low strength	Moderate: depth to rock
162*:						
Poposhia	Slight	Slight	Slight	Moderate: slope	Severe: low strength	Slight
Trimad	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Moderate: droughty, slope
163*:						
Redthayne	Slight	Slight	Slight	Moderate: slope	Slight	Moderate: small stones, droughty

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
163*:						
Tyzak, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Severe: depth to rock
Evanston	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: frost action, shrink-swell	Slight
164*:						
Redthayne	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Tyzak	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
165*:						
Riverwash	Severe: cutbanks cave, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness
166*:						
Rock outcrop	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
167*:						
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
Cathedral	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
168*:						
Taluce	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Taluce, thin solum	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope, depth to rock	Severe: depth to rock
Rock outcrop	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope, depth to rock	Severe: depth to rock
169*:						
Taluce	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope, depth to rock	Severe: depth to rock

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
169*:						
Taluce, thin solum	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope, depth to rock	Severe: depth to rock
Turnercrest	Moderate: slope, depth to rock	Moderate: slope	Moderate: slope, depth to rock	Severe: slope	Moderate: slope	Moderate: slope, depth to rock
170*:						
Tieside, north slopes	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
171*:						
Treon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Aberone	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: droughty slope
172*:						
Treon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Aberone	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: droughty, slope
Treon, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
173*:						
Treon, dry	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Aberone	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
174*:						
Treon, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope depth to rock
Treon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
175*:						
Treon, dry	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Bayard	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
176*:						
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Blazon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
177*:						
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
178*:						
Trimad	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Evanston	Moderate: slope	Moderate: shrink-swell, slope	Moderate: shrink-swell, slope	Severe: slope	Moderate: frost action, shrink-swell, slope	Moderate: slope
179*:						
Trimad, dry	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Moderate: slope, droughty
Poposhia, dry	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope
180*:						
Trimad	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Moderate: slope, droughty
Weed	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: frost action, low strength, shrink-swell	Slight
Blazon	Severe: depth to rock	Moderate: slope, depth to rock	Severe: depth to rock	Severe: slope	Moderate: low strength, slope, depth to rock	Severe: depth to rock

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
181*:						
Tyzak	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
Tyzak, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, small stones, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: depth to rock
182*:						
Urban land.						
Albinas	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: low strength, shrink-swell	Slight
183*:						
Urban land.						
Altvan	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
184*:						
Urban land.						
Ascalon	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: frost action, low strength, shrink-swell	Slight
185*:						
Urban land.						
Bayard	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
186*:						
Urban land.						
Evanston	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: frost action, shrink-swell	Slight
187*:						
Urban land.						
Merden	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, low strength, wetness	Severe: flooding, wetness
188*:						
Urban land.						
Poposhia	Slight	Slight	Slight	Slight	Severe: low strength	Slight

See footnote at end of table.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
189*: Urban land.						
Poposhia	Slight	Slight	Slight	Moderate: slope	Severe: low strength	Slight
Trimad	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action, slope	Moderate: droughty, slope
190: Valent	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
191*: Valent	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope, droughty
Treon	Severe: slope, depth to rock	Severe: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope, depth to rock
192, 193: Vetal	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
194: Vonalee	Slight	Slight	Slight	Slight	Slight	Slight
195: Wages	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
196: Weed	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: frost action, low strength, shrink-swell	Slight

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
100:					
Albinas	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
101:					
Altvan	Severe: poor filter	Severe: seepage	Severe: too sandy	Slight	Poor: seepage, small stones, too sandy
102*:					
Altvan	Severe: poor filter	Severe: seepage, slope	Severe: too sandy	Slight	Poor: seepage, small stones, too sandy
Dix	Severe: poor filter	Severe: seepage, slope	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, small stones, too sandy
103:					
Ascalon	Slight	Severe: seepage, slope	Slight	Slight	Good
104:					
Ascalon	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
105:					
Bayard	Slight	Severe: seepage, slope	Severe: seepage	Severe: seepage	Good
106:					
Bayard, wet	Severe: flooding, wetness	Severe: flooding, seepage, wetness	Severe: flooding, seepage, wetness	Severe: flooding, seepage, wetness	Fair: wetness
107*:					
Bayard	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good
Paoli	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good
108*:					
Blazon	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Poor: depth to rock
Blazon, thin solum	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Poor: depth to rock

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
108*:					
Poposhia	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
109*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Chaperton	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Moderate: slope	Poor: depth to rock
110*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Chaperton	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
111*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Trimad	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope, small stones
112*:					
Boyle	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock	Severe: slope	Poor: slope, small stones, depth to rock
Alderon	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock, seepage	Poor: slope, depth to rock
Cathedral	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: seepage, small stones, depth to rock
113*:					
Boyle	Severe: depth to rock	Severe: seepage, depth to rock	Severe: depth to rock	Slight	Poor: small stones, depth to rock
Boyle, thin solum	Severe: depth to rock	Severe: depth to rock, seepage	Severe: depth to rock	Slight	Poor: depth to rock, small stones

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
114*:					
Boyle, thin solum------	Severe: depth to rock	Severe: seepage, depth to rock	Severe: depth to rock	Slight	Poor: depth to rock, small stones
Breece-----------------	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
Cathedral--------------	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: seepage, small stones, depth to rock
115*:					
Boyle, very stony------	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock	Severe: slope	Poor: slope, small stones, depth to rock
Boyle, thin solum------	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock, small stones
Lininger---------------	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
116*:					
Boyle------------------	Severe: depth to rock	Severe: slope, depth to rock, seepage	Severe: depth to rock	Moderate: slope	Poor: small stones, depth to rock
Lininger---------------	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Boyle, thin solum------	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock, small stones
117*:					
Boyle------------------	Severe: depth to rock	Severe: slope, depth to rock, seepage	Severe: depth to rock	Moderate: slope	Poor: small stones, depth to rock
Rock outcrop-----------	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock, slope
Cathedral--------------	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: seepage, small stones, depth to rock

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
118*:					
Boyle	Severe: depth to rock	Severe: slope, depth to rock, seepage	Severe: depth to rock	Moderate: slope	Poor: small stones, depth to rock
Lininger	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
119:					
Breece	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
120:					
Bresser	Severe: poor filter	Severe: seepage	Moderate: too sandy	Slight	Fair: small stones, too sandy
121:					
Cantle	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
122*:					
Cantle	Severe: flooding, wetness	Severe: flooding, seepage, wetness	Severe: flooding, seepage, wetness	Severe: flooding, seepage, wetness	Poor: wetness
Merden, saline	Severe: flooding, percs slowly, wetness	Severe: flooding	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
123*:					
Cathedral	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: seepage, small stones, depth to rock
Boyle	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock	Severe: slope	Poor: slope, small stones, depth to rock
124*:					
Chalkcreek Family	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Fair: wetness
125*:					
Chalkcreek	Moderate: percs slowly	Moderate: seepage	Slight	Slight	Good
Tieside	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Poor: depth to rock
126:					
Chivington	Severe: percs slowly	Moderate: slope	Severe: too clayey	Slight	Poor: hard to pack, too clayey

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
127:					
Cowestglen	Severe: flooding	Severe: flooding, seepage	Severe: flooding	Severe: flooding	Good
128*:					
Dalecreek	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Fair: small stones, wetness
Kovich, cool	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: small stones, wetness
129*:					
Dix	Severe: slope, poor filter	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, small stones, too sandy
Altvan	Severe: poor filter	Severe: seepage, slope	Severe: too sandy	Moderate: slope	Poor: seepage, small stones, too sandy
130:					
Embry	Slight	Severe: seepage	Slight	Slight	Good
131:					
Evanston	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
132*:					
Evanston	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Weed	Severe: percs slowly	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope, small stones
133*:					
Evanston	Moderate: percs slowly, slope	Severe: seepage, slope	Moderate: slope	Moderate: slope	Fair: slope, small stones
Weed	Severe: percs slowly	Moderate: seepage, slope	Slight	Slight	Fair: small stones
Trimad	Moderate: slope	Severe: seepage, slope	Moderate: slope, large stones	Moderate: slope	Poor: small stones
134*:					
Evanston	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Fair: small stones
Ipson	Moderate: percs slowly, slope	Severe: seepage, slope	Moderate: slope	Moderate: slope	Poor: small stones

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
135*:					
Haverdad	Severe: flooding, poor filter	Severe: flooding, seepage	Severe: flooding, too sandy	Severe: flooding	Poor: seepage, small stones, too sandy
Clarkelen	Severe: flooding, wetness	Severe: flooding, seepage, wetness	Severe: flooding, seepage, wetness	Severe: flooding, seepage, wetness	Poor: thin layer
Kovich, warm	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
136:					
Haverson	Moderate: flooding, percs slowly	Moderate: seepage	Severe: too sandy	Moderate: flooding	Poor: too sandy
137*:					
Ipson	Slight	Severe: seepage	Moderate: large stones	Slight	Poor: seepage, small stones
Breece, dry	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
Evanston	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
138*:					
Ipson	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: seepage, slope, small stones
Evanston	Moderate: percs slowly, slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
139*:					
Ipson	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: seepage, slope, small stones
Evanston	Moderate: percs slowly	Severe: slope	Slight	Slight	Good
Rock outcrop	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock, slope
140*:					
Ipson	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope, small stones
Pinelli	Severe: percs slowly	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
140*:					
Rock outcrop	Severe: depth to rock,	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock, slope
141*:					
Ipson	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: seepage, slope, small stones
Trimad	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope, small stones
142:					
Manter	Slight	Severe: seepage	Slight	Slight	Good
143:					
Manter	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope
144*:					
Manter	Slight	Severe: seepage	Slight	Slight	Good
Treon	Severe: depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, depth to rock	Severe: depth to rock	Poor: depth to rock
145:					
Merden	Severe: flooding, percs slowly, wetness	Severe: flooding	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
146*:					
Merden, cool	Severe: flooding, percs slowly, wetness	Severe: flooding	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
Kovich	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: small stones, wetness
147:					
Mitchell	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
148:					
Moskee	Moderate: percs slowly	Severe: seepage	Slight	Slight	Good
149:					
Nucla	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Good

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
150:					
Otero	Slight	Severe: seepage	Slight	Slight	Good
151*:					
Otero	Slight	Severe: seepage	Slight	Slight	Good
Valent	Severe: poor filter	Severe: seepage	Moderate: too sandy	Slight	Fair: too sandy
Tassel	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Poor: depth to rock
152:					
Paoli	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good
153:					
Paoli	Slight	Severe: seepage, slope	Severe: seepage	Severe: seepage	Good
154:					
Peetz	Severe: poor filter	Severe: seepage, slope	Severe: too sandy	Moderate: slope	Poor: seepage, small stones, too sandy
155*:					
Peetz	Severe: poor filter	Severe: seepage, slope	Severe: too sandy	Moderate: slope	Poor: seepage, small stones, too sandy
Altvan	Severe: poor filter	Severe: seepage	Severe: too sandy	Slight	Poor: seepage, too sandy
156:					
Pinelli	Severe: percs slowly	Moderate: slope	Slight	Slight	Good
157*:					
Pinelli	Severe: percs slowly	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
Chivington	Severe: percs slowly	Moderate: slope	Moderate: too clayey	Slight	Fair: small stones, too clayey
158:					
Poposhia	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
159*:					
Poposhia	Moderate: percs slowly, slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
159*:					
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
160*:					
Poposhia	Moderate: percs slowly, slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
161*:					
Poposhia	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
Piezon	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Poor: depth to rock
162*:					
Poposhia	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
Trimad	Moderate: slope	Severe: seepage, slope	Moderate: slope, large stones	Moderate: slope	Poor: small stones
163*:					
Redthayne	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Poor: small stones
Tyzak, thin solum	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Evanston	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
164*:					
Redthayne	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope, small stones
Tyzak	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, small stones, depth to rock
Rock outcrop	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock, slope

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
165*:					
Riverwash	Severe: flooding, wetness, poor filter	Severe: flooding, wetness, seepage	Severe: flooding, wetness, seepage	Severe: flooding, wetness, seepage	Poor: small stones, wetness, too sandy
166*:					
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
167*:					
Rock outcrop	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock, slope
Cathedral	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: seepage, small stones, depth to rock
168*:					
Taluce	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Taluce, thin solum	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Moderate: slope	Poor: depth to rock
Rock outcrop	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
169*:					
Taluce	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Moderate: slope	Poor: depth to rock
Taluce, thin solum	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Moderate: slope	Poor: depth to rock
Turnercrest	Severe: depth to rock	Severe: seepage, slope, depth to rock	Severe: depth to rock	Moderate: slope	Poor: depth to rock
170*:					
Tieside, north slopes	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Rock outcrop	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock. slope

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
171*:					
Treon	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Aberone	Moderate: slope	Severe: seepage, slope	Moderate: large stones, slope	Moderate: slope	Poor: seepage, small stones
172*:					
Treon	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Aberone	Moderate: slope	Severe: seepage, slope	Moderate: large stones, slope	Moderate: slope	Poor: seepage, small stones
Treon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
173*:					
Treon, dry	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Aberone	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: seepage, slope, small stones
174*:					
Treon, thin solum	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Treon	Severe: slope, depth to rock	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock, seepage	Severe: slope, depth to rock	Poor: slope, depth to rock
175*:					
Treon, dry	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
Bayard	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
176*:					
Trimad	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope, small stones
Blazon	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
177*:					
Trimad	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope, small stones
Blazon, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope	Poor: slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
178*:					
Trimad	Severe: slope	Severe: seepage, slope	Severe: slope	Severe: slope	Poor: slope, small stones
Evanston	Moderate: percs slowly, slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
179*:					
Trimad, dry	Moderate: slope	Severe: seepage, slope	Moderate: slope, large stones	Moderate: slope	Poor: small stones
Poposhia, dry	Moderate: percs slowly, slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
180*:					
Trimad	Moderate: slope	Severe: seepage, slope	Moderate: slope, large stones	Moderate: slope	Poor: small stones
Weed	Severe: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
Blazon	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Moderate: slope	Poor: depth to rock
181*:					
Tyzak	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, small stones, depth to rock
Tyzak, thin solum	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
181*:					
Rock outcrop	Severe: depth to rock	Severe: slope, depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
182*:					
Urban land.					
Albinas	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
183*:					
Urban land.					
Altvan	Severe: poor filter	Severe: seepage	Severe: too sandy	Slight	Poor: seepage, small stones, too sandy
184*:					
Urban land.					
Ascalon	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
185*:					
Urban land.					
Bayard	Slight	Severe: seepage, slope	Severe: seepage	Severe: seepage	Good
186*:					
Urban land.					
Evanston	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
187*:					
Urban land.					
Merden	Severe: flooding, percs slowly, wetness	Severe: flooding	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
188*:					
Urban land.					
Poposhia	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good
189*:					
Urban land.					
Poposhia	Moderate: percs slowly	Moderate: seepage, slope	Slight	Slight	Good

See footnote at end of table.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
189*:					
Trimad	Moderate: slope	Severe: seepage, slope	Moderate: slope, large stones	Moderate: slope	Poor: small stones
190:					
Valent	Severe: poor filter	Severe: seepage	Moderate: too sandy	Slight	Fair: too sandy
191*:					
Valent	Severe: poor filter	Severe: seepage, slope	Moderate: slope, too sandy	Moderate: slope	Fair: slope, too sandy
Treon	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
192, 193:					
Vetal	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good
194:					
Vonalee	Slight	Severe: seepage	Slight	Slight	Good
195:					
Wages	Slight	Severe: seepage	Slight	Slight	Good
196:					
Weed	Severe: percs slowly	Moderate: seepage, slope	Slight	Slight	Good

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
100:				
Albinas	Good	Improbable: excess fines	Improbable: excess fines	Good
101:				
Altvan	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy
102*:				
Altvan	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy
Dix	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy
103:				
Ascalon	Good	Improbable: excess fines	Improbable: excess fines	Good
104:				
Ascalon	Fair: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey
105:				
Bayard	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
106:				
Bayard, wet	Good	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
107*:				
Bayard	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Paoli	Good	Improbable: excess fines	Improbable: excess fines	Good
108*:				
Blazon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
Blazon, thin solum	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
109*:				
Blazon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
109*:				
Chaperton	Poor: low strength, depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: slope, too clayey, depth to rock
110*:				
Blazon	Poor: low strength, shrink-swell, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Chaperton	Poor: low strength, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
Rock outcrop	Poor: slope, area reclaim	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
111*:				
Blazon	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Trimad	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones
112*:				
Boyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
Alderon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones
Cathedral	Poor: depth to rock	Improbable: small stones	Improbable: thin layer	Poor: slope, small stones, depth to rock
113*:				
Boyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
Boyle, thin solum	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
114*:				
Boyle, thin solum	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
Breece	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
114*:				
Cathedral	Poor: depth to rock	Improbable: small stones	Improbable: thin layer	Poor: slope, small stones, depth to rock
115*:				
Boyle, very stony	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
Boyle, thin solum	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
Lininger	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones
116*:				
Boyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
Lininger	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones
Boyle, thin solum	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
117*:				
Boyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
Rock outcrop	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Cathedral	Poor: depth to rock	Improbable: small stones	Improbable: thin layer	Poor: slope, small stones, depth to rock
118*:				
Boyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
Lininger	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
119:				
Breece	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
120:				
Bresser	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, small stones, too clayey
121:				
Cantle	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
122*:				
Cantle	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, wetness
Merden, saline	Poor: low strength, wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
123*:				
Cathedral	Poor: depth to rock	Improbable: small stones	Improbable: thin layer	Poor: slope, small stones, depth to rock
Boyle	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
124*:				
Chalkcreek Family	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
125*:				
Chalkcreek	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
Tieside	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
126:				
Chivington	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
127:				
Cowestglen	Good	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
128*:				
Dalecreek	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones
Kovich, cool	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, wetness
129*:				
Dix	Fair: slope	Probable	Probable	Poor: area reclaim, small stones, too sandy

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
129*:				
Altvan	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy
130:				
Embry	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
131:				
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
132*:				
Evanston	Fair: shrink-swell, slope	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones
Weed	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, small stones, too clayey
133*:				
Evanston	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, slope, small stones
Weed	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, small stones, too clayey
Trimad	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
134*:				
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, small stones, too clayey
Ipson	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
135*:				
Haverdad	Good	Probable	Probable	Poor: area reclaim, small stones
Clarkelen	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, small stones, too sandy
Kovich, warm	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
136:				
Haverson	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
137*:				
Ipson	Good	Probable	Probable	Poor: area reclaim, small stones
Breece, dry	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
138*:				
Ipson	Fair: slope	Probable	Probable	Poor: area reclaim, slope, small stones
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: slope, too clayey
139*:				
Ipson	Fair: slope	Probable	Probable	Poor: area reclaim, slope, small stones
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
Rock outcrop	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
140*:				
Ipson	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones
Pinelli	Fair: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Rock outcrop	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
141*:				
Ipson	Fair: slope	Probable	Probable	Poor: area reclaim, slope, small stones
Trimad	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
142:				
Manter	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
143:				
Manter	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
144*:				
Manter	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Treon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
145:				
Merden	Poor: low strength, wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
146*:				
Merden, cool	Poor: low strength, wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
Kovich	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, wetness
147:				
Mitchell	Good	Improbable: excess fines	Improbable: excess fines	Good
148:				
Moskee	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey
149:				
Nucla	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
150:				
Otero	Good	Improbable: excess fines	Improbable: excess fines	Good
151*:				
Otero	Good	Improbable: excess fines	Improbable: excess fines	Good
Valent	Good	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
Tassel	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
152, 153:				
Paoli	Good	Improbable: excess fines	Improbable: excess fines	Good
154:				
Peetz	Good	Probable	Probable	Poor: area reclaim, small stones

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
155*:				
Peetz	Good	Probable	Probable	Poor: area reclaim, small stones
Altvan	Good	Probable	Probable	Poor: small stones, too sandy
156:				
Pinelli	Fair: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
157*:				
Pinelli	Fair: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
Chivington	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
158:				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
159*:				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: slope
Blazon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
160*:				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: slope
Blazon, thin solum	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Rock outcrop	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
161*:				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
Piezon	Poor: low strength, depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: thin layer, depth to rock
162*:				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
Trimad	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
163*:				
Redthayne	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
Tyzak, thin solum	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
164*:				
Redthayne	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones
Tyzak	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
Rock outcrop	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
165*:				
Riverwash	Poor: wetness	Probable	Probable	Poor: area reclaim, small stones, too sandy
166*:				
Rock outcrop	Poor: slope, area reclaim	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Blazon, thin solum	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
167*:				
Rock outcrop	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Cathedral	Poor: slope, depth to rock	Improbable: small stones	Improbable: thin layer	Poor: slope, small stones, depth to rock
168*:				
Taluce	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Taluce, thin solum	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
Rock outcrop	Poor: area reclaim	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
169*:				
Taluce-------------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
Taluce, thin solum------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
Turnercrest-------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: slope, thin layer, depth to rock
170*:				
Tieside, north slopes---	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Rock outcrop------------	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
171*:				
Treon-------------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Aberone-----------------	Good	Improbable: small stones	Probable	Poor: area reclaim, small stones
172*:				
Treon-------------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Aberone-----------------	Good	Improbable: small stones	Probable	Poor: area reclaim, small stones
Treon, thin solum-------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
173*:				
Treon, dry--------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Aberone-----------------	Fair: slope	Improbable: small stones	Probable	Poor: area reclaim, slope, small stones
174*:				
Treon, thin solum-------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Rock outcrop------------	Poor: area reclaim	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
174*:				
Treon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
175*:				
Treon, dry	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Bayard	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
176*:				
Trimad	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones
Blazon	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
177*:				
Trimad	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones
Blazon, thin solum	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
Rock outcrop	Poor: slope, area reclaim	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
178*:				
Trimad	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, slope, small stones
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: slope, too clayey
179*:				
Trimad, dry	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
Poposhia, dry	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: slope
180*:				
Trimad	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
Weed	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
180*:				
Blazon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
181*:				
Tyzak	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
Tyzak, thin solum	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, depth to rock
Rock outcrop	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
182*:				
Urban land.				
Albinas	Good	Improbable: excess fines	Improbable: excess fines	Good
183*:				
Urban land.				
Altvan	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy
184*:				
Urban land.				
Ascalon	Fair: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey
185*:				
Urban land.				
Bayard	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
186*:				
Urban land.				
Evanston	Fair: shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
187*:				
Urban land.				
Merden	Poor: low strength, wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
188*:				
Urban land.				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good

See footnote at end of table.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
189*:				
Urban land.				
Poposhia	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Good
Trimad	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
190:				
Valent	Good	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
191*:				
Valent	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope, too sandy
Treon	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, depth to rock
192, 193:				
Vetal	Good	Improbable: excess fines	Improbable: excess fines	Good
194:				
Vonalee	Good	Improbable: excess fines	Improbable: excess fines	Good
195:				
Wages	Good	Improbable: excess fines	Improbable: excess fines	Good
196:				
Weed	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
100:						
Albinas	Moderate: seepage, slope	Severe: piping	Severe: no water	Slope	Favorable	Favorable
101:						
Altvan	Severe: seepage	Severe: seepage	Severe: no water	Slope	Too sandy	Favorable
102*:						
Altvan	Severe: seepage,	Severe: seepage	Severe: no water	Slope	Too sandy	Favorable
Dix	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty	Slope, large stones, too sandy	Too arid, large stones, slope
103:						
Ascalon	Severe: seepage	Slight	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
104:						
Ascalon	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
105:						
Bayard	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
106:						
Bayard, wet	Severe: seepage	Severe: piping	Severe: cutbanks cave	Soil blowing, flooding	Soil blowing	Favorable
107*:						
Bayard	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Fevorable
Paoli	Severe: seepage	Severe: piping	Severe: no water	Soil blowing	Soil blowing	Favorable
108*:						
Blazon	Severe: depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Depth to rock, erodes easily	Too arid, erodes easily
Blazon, thin solum	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: depth to rock, erodes easily	Depth to rock erodes easily	Too arid, erodes easily
Poposhia	Moderate: seepage	Moderate: piping	Severe: no water	Erodes easily	Erodes easily	Too arid, erodes easily

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
109*:						
Blazon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock	Slope, depth to rock erodes easily	Too arid, slope, erodes easily
Chaperton	Severe: slope	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock erodes easily	Too arid, slope, erodes easily
110*:						
Blazon	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope depth to rock
Chaperton	Severe: slope	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
111*:						
Blazon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Slope, depth to rock erodes easily	Too arid, slope, erodes easily
Trimad	Severe: seepage slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
112*:						
Boyle	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope
Alderon	Severe: seepage, slope	Severe: thin layer	Severe: no water	Slope, droughty	Slope, depth to rock	Slope, droughty, depth to rock
Cathedral	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
113*:						
Boyle	Severe: depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Depth to rock	Too arid
Boyle, thin solum	Severe: depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Depth to rock	Too arid
114*:						
Boyle, thin solum	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
114*:						
Breece	Severe: seepage	Moderate: seepage, piping	Severe: no water	Droughty, soil blowing	Soil blowing	Droughty
Cathedral	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
115*:						
Boyle, very stony	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, droughty, depth to rock	Slope, large stones, depth to rock	Too arid, large stones, slope
Boyle, thin solum	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope
Lininger	Severe: slope	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
116*:						
Boyle	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope
Lininger	Severe: slope	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
Boyle, thin solum	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope
117*:						
Boyle	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
Cathedral	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
118*:						
Boyle	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Too arid, slope
Lininger	Moderate: seepage, slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Depth to rock	Depth to rock
119:						
Breece	Severe: seepage	Moderate: seepage, piping	Severe: no water	Slope, droughty, soil blowing	Soil blowing	Droughty

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
120:						
Bresser	Severe: seepage	Severe: seepage, piping	Severe: no water	Soil blowing	Too sandy, soil blowing	Favorable
121:						
Cantle	Moderate: seepage	Severe: wetness	Moderate: slow refill	Wetness, flooding	Wetness	Wetness
122*:						
Cantle	Severe: seepage	Severe: wetness	Moderate: slow refill	Wetness, flooding	Wetness	Wetness
Merden, saline	Slight	Severe: wetness	Severe: slow refill	Wetness, percs slowly, flooding	Erodes easily, wetness, percs slowly	Wetness, excess salt, erodes easily
123*:						
Cathedral	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
Boyle	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Sloope, depth to rock	Too arid, slope
124*:						
Chalkcreek Family	Moderate: seepage	Moderate: piping, wetness	Moderate: slow refill, deep to water	Favorable	Favorable	Too arid
125*:						
Chalkcreek	Moderate: seepage	Moderate: piping	Severe: no water	Favorable	Favorable	Too arid
Tieside	Severe: depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Depth to rock	Too arid, depth to rock
126:						
Chivington	Moderate: slope	Moderate: hard to pack	Severe: no water	Slope, percs slowly	Erodes easily, percs slowly	Erodes easily, percs slowly
127:						
Cowestglen	Severe: seepage	Slight	Severe: no water	Soil blowing, flooding	Soil blowing	Too arid
128*:						
Dalecreek	Moderate: seepage, slope	Moderate: wetness	Moderate: slow refill, deep to water	Slope	Favorable	Favorable
Kovich, cool	Moderate: seepage, slope	Severe: wetness	Moderate: slow refill	Slope, wetness	Wetness	Wetness
129*:						
Dix	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty	Slope, large stones, too sandy	Too arid, large stones, slope

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
129*:						
Altvan	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope	Slope, too sandy	Slope
130:						
Embry	Severe: seepage	Severe: piping	Severe: no water	Slope, fast intake soil blowing	Soil blowing	Too arid
131:						
Evanston	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
132*:						
Evanston	Severe: slope	Slight	Severe: no water	Slope	Slope	Slope
Weed	Severe: slope	Slight	Severe: no water	Slope, soil blowing	Slope, soil blowing	Slope
133*:						
Evanston	Severe: seepage, slope	Moderate: seepage	Severe: no water	Slope	Slope	Slope
Weed	Moderate: seepage, slope	Slight	Severe: no water	Slope	Favorable	Favorable
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
134*:						
Evanston	Moderate: seepage, slope	Slight	Severe: no water	Slope	Favorable	Favorable
Ipson	Severe: seepage, slope	Moderate: thin layer	Severe: no water	Slope	Slope	Too arid, slope
135*:						
Haverdad	Severe: seepage	Severe: seepage	Severe: no water	Flooding	Too sandy	Too arid
Clarkelen	Severe: seepage	Moderate: seepage, piping, thin layer	Severe: cutbanks cave	Wetness, droughty, soil blowing	Wetness, too sandy soil blowing	Too arid, droughty
Kovich, warm	Moderate: seepage	Severe: wetness	Moderate: slow refill	Wetness, flooding	Wetness	Wetness
136:						
Haverson	Moderate: seepage	Severe: piping	Severe: no water	Favorable	Too sandy	Too arid

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
137*:						
Ipson	Severe: seepage	Severe: seepage	Severe: no water	Slope, droughty	Large stones	Too arid, large stones
Breece, dry	Severe: seepage	Moderate: seepage, piping	Severe: no water	Droughty, soil blowing	Soil blowing	Droughty
Evanston	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
138*:						
Ipson	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Evanston	Severe: slope	Moderate: piping	Severe: no water	Slope	Slope	Slope
139*:						
Ipson	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Evanston	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
140*:						
Ipson	Severe: seepage, slope	Moderate: thin layer	Severe: no water	Slope	Slope	Too arid, slope
Pinelli	Severe: slope	Moderate: piping	Severe: no water	Slope, percs slowly	Slope	Too arid, slope, perks slowly
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
141*:						
Ipson	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope droughty	Slope, large stones	Too arid, large stones, slope
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
142:						
Manter	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
143:						
Manter	Severe: seepage, slope	Severe: piping	Severe: no water	Slope, soil blowing	Slope, soil blowing	Slope
144*:						
Manter	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
Treon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
145:						
Merden	Slight	Severe: wetness	Severe: slow refill	Wetness, percs slowly, flooding	Erodes easily, wetness, percs slowly	Wetness, excess salt, erodes easily
146*:						
Merden, cool	Slight	Severe: wetness	Severe: slow refill	Wetness, percs slowly, flooding	Erodes easily, wetness, percs slowly	Wetness, erodes easily, percs slowly
Kovich	Moderate: seepage	Severe: wetness	Moderate: slow refill	Wetness	Wetness	Wetness
147:						
Mitchell	Moderate: seepage, slope	Severe: piping	Severe: no water	Slope, erodes easily	Erodes easily	Too arid, erodes easily
148:						
Moskee	Severe: seepage	Severe: piping	Severe: no water	Soil blowing	Soil blowing	Favorable
149:						
Nucla	Severe: seepage	Slight	Severe: no water	Favorable	Favorable	Favorable
150:						
Otero	Severe: seepage	Slight	Severe: no water	Slope, soil blowing	Soil blowing	Too arid
151*:						
Otero	Severe: seepage	Slight	Severe: no water	Slope, soil blowing	Soil blowing	Too arid
Valent	Severe: seepage	Severe: piping	Severe: no water	Slope, droughty, fast intake	Soil blowing	Too arid, droughty
Tassel	Severe: depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Depth to rock, soil blowing	Too arid, depth to rock
152:						
Paoli	Severe: seepage	Severe: piping	Severe: no water	Soil blowing	Soil blowing	Favorable

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
153:						
Paoli	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
154:						
Peetz	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty	Slope, too sandy	Too arid, slope, droughty
155*:						
Peetz	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty	Slope, too sandy	Too arid, slope, droughty
Altvan	Severe: seepage	Severe: seepage	Severe: no water	Slope, droughty, soil blowing	Too sayd, soil blowing	Droughty
156:						
Pinelli	Moderate: slope	Moderate: piping	Severe: no water	Slope, percs slowly	Favorable	Too arid, percs slowly
157*:						
Pinelli	Severe: slope	Moderate: piping	Severe: no water	Slope, percs slowly	Slope	Too arid, slope, percs slowly
Chivington	Moderate: slope	Slight	Severe: no water	Slope, percs slowly	Erodes easily	Erodes easily, percs slowly
158:						
Poposhia	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope, erodes easily	Erodes easily	Too arid, erodes easily
159*:						
Poposhia	Severe: slope	Moderate: piping	Severe: no water	Slope, erodes easily	Slope, erodes easily	Too arid, slope, erodes easily
Blazon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily
160*:						
Poposhia	Severe: slope	Moderate: piping	Severe: no water	Slope, erodes easily	Slope, erodes easily	Too arid, slope, erodes easily
Blazon, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
161*:						
Poposhia	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope, erodes easily	Erodes easily	Too arid, erodes easily
Piezon	Moderate: seepage, slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Depth to rock, erodes easily	Too arid, erodes easily, depth to rock
162*:						
Poposhia	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope, erodes easily	Erodes easily	Too arid, erodes easily
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
163*:						
Redthayne	Moderate: seepage, slope	Slight	Severe: no water	Slope, droughty	Favorable	Too arid, droughty
Tyzak, thin solum	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
Evanston	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
164*:						
Redthayne	Severe: slope	Slight	Severe: no water	Slope, droughty	Slope	Too arid, slope, droughty
Tyzak	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
165*:						
Riverwash	Severe: seepage	Severe: wetness	Severe: cutbanks cave	Wetness, droughty, fast intake	Large stones, wetness, too sandy	Large stones, wetness, droughty
166*:						
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
Blazon, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
167*:						
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
Cathedral	Severe: slope, depth to rock	Severe: seepage	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
168*:						
Taluce	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Taluce, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, Depth to rock, soil blowing	Too arid, slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope depth to rock	Slope, depth to rock
169*:						
Taluce	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Taluce, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Turnercrest	Severe: seepage, slope	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, erodes easily	To arid, slope, erodes easily
170*:						
Tieside, north slopes	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope depth to rock	Too arid, slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
171*:						
Treon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Aberone	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Too arid, large stones, slope

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
172*:						
Treon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Aberone	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Too arid, large stones, slope
Treon, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
173*:						
Treon, dry	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Aberone	Severe: seepage, slope	Severe: seepage	Severe: no water	Slope, droughty, soil blowing	Slope, large stones, soil blowing	Too arid, large stones, slope
174*:						
Treon, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
Treon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
175*:						
Treon, dry	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
Bayard	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
176*:						
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Blazon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
177*:						
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Blazon, thin solum	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock, erodes easily	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
178*:						
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Evanston	Severe: slope	Moderate: piping	Severe: no water	Slope	Slope	Slope
179*:						
Trimad, dry	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Poposhia, dry	Severe: slope	Moderate: piping	Severe: no water	Slope, erodes easily	Slope, erodes easily	Too arid, slope, erodes easily
180*:						
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
Weed	Moderate: seepage, slope	Severe: piping	Severe: no water	Slope	Favorable	Favorable
Blazon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, depth to rock	Slope, depth to rock, erodes easily	Too arid, slope, erodes easily
181*:						
Tyzak	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock
Tyzak, thin solum	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, droughty, depth to rock	Slope, depth to rock	Slope, large stones, droughty
Rock outcrop	Severe: slope, depth to rock	Severe: thin layer	Severe: no water	Slope, depth to rock	Slope, depth to rock	Slope, depth to rock
182*:						
Urban land.						

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
182*:						
Albinas	Moderate: seepage, slope	Severe: piping	Severe: no water	Slope	Favorable	Favorable
183*:						
Urban land.						
Altvan	Severe: seepage	Severe: seepage	Severe: no water	Slope	Too sandy	Too arid
184*:						
Urban land.						
Ascalon	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
185*:						
Urban land.						
Bayard	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
186*:						
Urban land.						
Evanston	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope	Favorable	Favorable
187*:						
Urban land.						
Merden	Slight	Severe: wetness	Severe: slow refill	Wetness, percs slowly, flooding	Erodes easily, wetness, percs slowly	Wetness, excess salt, erodes easily
188*:						
Urban land.						
Poposhia	Moderate: seepage, slope	Moderate: piping	Severe: no water	Slope, erodes easily	Erodes easily	Too arid, erodes easily
189*:						
Urban land.						
Poposhia	Moderate: seepage slope	Moderate: piping	Severe: no water	Slope, erodes easily	Erodes easily	Too arid, erodes easily
Trimad	Severe: seepage, slope	Moderate: large stones	Severe: no water	Slope, droughty	Slope, large stones	Too arid, large stones, slope
190:						
Valent	Severe: seepage	Severe: piping	Severe: no water	Slope, droughty, fast intake	Soil blowing	Too arid, droughty

See footnote at end of table.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Irrigation	Terraces and diversions	Grassed waterways
191*:						
Valent	Severe: seepage, slope	Severe: piping	Severe: no water	Slope, droughty, fast intake	Slope, soil blowing	Too arid, slope, droughty
Treon	Severe: slope, depth to rock	Severe: piping	Severe: no water	Slope, soil blowing, depth to rock	Slope, depth to rock, soil blowing	Too arid, slope, depth to rock
192:						
Vetal	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Favorable
193:						
Vetal	Severe: seepage	Severe: piping	Severe: no water	Slope, fast intake soil blowing	Soil blowing	Favorable
194:						
Vonalee	Severe: seepage	Severe: piping	Severe: no water	Slope, soil blowing	Soil blowing	Too arid
195:						
Wages	Severe: seepage	Slight	Severe: no water	Slope	Favorable	Favorable
196:						
Weed	Moderate: seepage, slope	Severe: piping	Severe: no water	Slope	Favorable	Favorable

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
100:												
Albinas----------	0-3	Loam	ML, CL-ML	A-4	0	0	100	95-100	80-100	50-75	15-30	NP-10
	3-25	Sandy clay loam, clay loam	SC, CL	A-6	0	0	100	95-100	80-100	40-80	30-40	10-20
	25-60	Loam	CL-ML	A-4	0	0	100	95-100	60-95	50-75	20-30	5-10
101:												
Altvan-----------	0-4	Loam	CL-ML	A-4	0	0	100	100	85-95	60-70	25-30	5-10
	4-24	Sandy clay loam	CL, SC	A-6	0	0	100	100	90-95	40-60	25-40	10-20
	24-60	Very gravelly sand	GW-GM, GM, GP-GM	A-1	0	0	35-55	30-50	20-35	5-15	---	NP
102*:												
Altvan-----------	0-8	Loam	CL-ML	A-4	0	0	100	100	85-95	60-70	25-30	5-10
	8-23	Sandy clay loam	CL	A-6	0	0	100	100	90-95	60-80	25-35	10-15
	23-27	Loam	CL	A-6	0	0	100	100	90-95	60-80	25-35	10-20
	27-60	Very gravelly sand	GW-GM, GM, GP-GM	A-1	0	0	35-55	30-50	20-35	5-15	---	NP
Dix--------------	0-11	Gravelly loam	GM, SM	A-4	0	0	60-80	55-75	50-70	40-50	15-20	NP-5
	11-23	Very gravelly sandy loam	GM	A-1	0	0	30-50	25-45	20-35	15-25	---	NP
	23-60	Extremely gravelly coarse sand, extremely gravelly sand, very gravelly sand	GW-GM, GP-GM	A-1	0	15-35	30-50	25-45	20-30	5-10	---	NP
103:												
Ascalon----------	0-6	Fine sandy loam	SC-SM	A-2-4, A-4	0	0	100	100	90-95	30-50	25-35	5-10
	6-21	Sandy clay loam, clay loam	CL, SC	A-6	0	0	100	100	90-95	45-65	25-40	10-20
	21-60	Sandy loam	SC-SM	A-2-4, A-4	0	0	95-100	95-100	70-85	30-45	25-35	5-10
104:												
Ascalon----------	0-9	Loam	CL	A-6	0	0	100	100	90-95	65-75	25-35	10-15
	9-26	Sandy clay loam, clay loam	CL, SC	A-6	0	0	100	100	90-95	45-65	25-40	10-20
	26-60	Loam	CL	A-6	0	0	90-100	85-100	80-95	55-75	25-35	10-15
105:												
Bayard-----------	0-10	Fine sandy loam	SM, SC-SM	A-4	0	0	85-100	80-100	70-85	35-50	15-25	NP-10
	10-29	Fine sandy loam, very fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	85-100	80-100	70-95	35-60	15-25	NP-10
	29-60	Fine sandy loam, loamy very fine sand	SM, SC-SM	A-4	0	0	85-100	80-100	70-95	35-50	15-25	NP-10

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
106:												
Bayard, wet-----	0-10	Fine sandy loam	SM	A-4	0	0	95-100	95-100	70-85	35-45	---	NP
	10-60	Stratified loamy very fine sand to very fine sandy loam	SM, SC-SM	A-4	0	0	100	95-100	70-85	35-50	15-30	NP-10
107*:												
Bayard----------	0-10	Fine sandy loam	SM, SC-SM	A-4	0	0	85-100	80-100	70-85	35-50	15-25	NP-10
	10-36	Fine sandy loam, very fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	85-100	80-100	70-95	35-60	15-25	NP-10
	36-60	Fine sandy loam, loamy very fine sand	SM, SC-SM	A-4	0	0	85-100	80-100	70-95	35-50	15-25	NP-10
Paoli-----------	0-21	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
	21-60	Fine sandy loam, sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
108*:												
Blazon----------	0-6	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	6-12	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	12	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Blazon, thin solum----------	0-3	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	3-7	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	7	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Poposhia--------	0-6	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	6-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
109*:												
Blazon----------	0-2	Gravelly silt loam	CL-ML	A-4	0	0	65-80	60-75	55-70	50-60	25-30	5-10
	2-15	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Chaperton-------	0-9	Loam	CL-ML	A-4	0	0-5	80-100	80-100	65-80	60-70	25-30	5-10
	9-27	Clay loam	CL	A-6	0	0-5	95-100	90-100	85-95	65-85	35-40	15-20
	27	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
110*:												
Blazon----------	0-2	Loam	CL	A-6	0	0	90-100	85-100	80-95	60-70	25-35	10-15
	2-13	Clay loam	CL	A-6, A-7	0	0	90-100	85-100	80-95	65-75	35-50	15-25
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Chaperton-------	0-6	Loam	CL-ML	A-4	0	0-5	80-100	80-100	65-80	60-70	25-30	5-10
	6-18	Silty clay loam	CL	A-6	0	0-5	95-100	90-100	85-95	75-85	30-40	10-15
	18-29	Clay loam	CL	A-6	0	0-5	95-100	90-100	85-95	65-85	35-40	15-20
	29	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
110*:												
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	.---
111*:												
Blazon----------	0-4	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	4-12	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	12	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Trimad----------	0-10	Loam	CL-ML	A-4	0	0	95-100	90-100	70-85	65-75	20-30	5-10
	10-60	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
112*:												
Boyle-----------	0-3	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	3-16	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Alderon---------	0-4	Gravelly sandy loam	SM, SC-SM	A-2, A-1	0	0	75-90	55-75	25-45	15-35	15-30	NP-10
	4-12	Sandy clay loam	SC	A-6, A-2	0	0	100	85-90	45-60	30-50	30-35	10-15
	12-33	Gravelly sandy clay loam	SC	A-2	0	0	70-80	50-65	30-40	20-35	30-35	10-15
	33	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Cathedral-------	0-7	Gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0-5	65-80	60-75	45-55	25-40	15-25	NP-10
	7-19	Very gravelly sandy loam, extremely gravelly sandy loam, very channery loam	GM-GC, GM, GP-GM	A-2, A-1	0	0-10	20-55	15-50	10-35	5-30	15-25	NP-10
	19	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
113*:												
Boyle-----------	0-7	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	7-15	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	15-17	Extremely gravelly sand, extremely gravelly coarse sandy loam, very gravelly sand	GP, GP-GM	A-1	0	0-10	25-45	20-40	15-30	0-10	---	NP
	17	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
113*:												
Boyle, thin solum----------	0-2	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	2-8	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	8	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
114*:												
Boyle, thin solum----------	0-4	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	4-8	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	8	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Breece----------	0-5	Sandy loam	SC-SM	A-4	0	0	95-100	85-100	65-80	35-45	25-30	5-10
	5-25	Gravelly sandy loam	SC-SM, SM	A-4, A-2	0	0-5	70-80	65-75	50-60	30-40	15-30	NP-10
	25-60	Gravelly coarse sandy loam, gravelly sandy loam	SC-SM, GM-GC, SM, GM	A-2, A-4, A-1-b	0	0-10	60-80	55-75	35-55	20-40	15-30	NP-10
Cathedral-------	0-7	Gravelly loam	SC-SM, SM	A-4	0	0-5	85-95	60-70	50-60	40-50	15-30	NP-10
	7-13	Very gravelly sandy loam, extremely gravelly sandy loam, very channery loam	GM-GC, GM, GP-GM	A-2, A-1	0	0-10	20-55	15-50	10-35	5-30	15-25	NP-10
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
115*:												
Boyle, very stony----------	0-3	Very cobbly loam	GM-GC, SC-SM	A-2-4	5-10	25-35	60-75	50-60	35-45	25-30	15-30	NP-10
	3-8	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	8-16	Very gravelly sandy clay loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Boyle, thin solum----------	0-3	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	3-9	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	9	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
115*:												
Lininger--------	0-4	Loam	SC-SM, CL-ML	A-4	0	0-5	90-100	80-100	60-80	40-60	20-30	5-10
	4-13	Sandy clay loam	CL	A-6	0	0-5	85-100	80-100	75-95	50-65	25-35	10-20
	13-26	Sandy clay loam, loam	SC, CL	A-6	0	0-5	80-100	75-95	70-90	45-65	25-40	10-20
	26-38	Gravelly sandy clay loam	SC, GC	A-6	0	0-5	70-80	65-75	55-65	35-50	25-35	10-20
	38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
116*:												
Boyle-----------	0-5	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	5-14	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	14	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Lininger--------	0-3	Loam	SC-SM, CL-ML	A-4	0	0-5	90-100	80-100	60-80	40-60	20-30	5-10
	3-9	Sandy clay loam	CL	A-6	0	0-5	85-100	80-100	75-95	50-65	25-35	10-20
	9-20	Sandy clay loam, loam	SC, CL	A-6	0	0-5	80-100	75-95	70-90	45-65	25-40	10-20
	20-22	Gravelly sandy clay loam	SC, GC	A-6	0	0-5	70-80	65-75	55-65	35-50	25-35	10-20
	22	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Boyle, thin solum----------	0-3	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	3-6	Very gravelly sandy clay loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	6	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
117*:												
Boyle-----------	0-7	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	7-15	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Cathedral-------	0-7	Gravelly loam	SC-SM, SM	A-4	0	0-5	85-95	60-70	50-60	40-50	15-30	NP-10
	7-13	Very gravelly sandy loam, extremely gravelly sandy loam, very channery loam	GM-GC, GM, GP-GM	A-2, A-1	0	0-10	20-55	15-50	10-35	5-30	15-25	NP-10
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
118*:												
Boyle-----------	0-4	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	4-14	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	14	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Lininger--------	0-4	Loam	SC-SM, CL-ML	A-4	0	0-5	90-100	80-100	60-80	40-60	20-30	5-10
	4-8	Sandy clay loam	CL	A-6	0	0-5	85-100	80-100	75-95	50-65	25-35	10-20
	8-15	Sandy clay loam, loam	SC, CL	A-6	0	0-5	80-100	75-95	70-90	45-65	25-40	10-20
	15-25	Gravelly sandy clay loam	SC, GC	A-6	0	0-5	70-80	65-75	55-65	35-50	25-35	10-20
	25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
119:												
Breece----------	0-4	Fine sandy loam	SC-SM	A-4	0	0	95-100	85-100	65-80	35-45	25-30	5-10
	4-23	Gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0-5	70-80	65-75	50-60	30-40	15-30	NP-10
	23-60	Gravelly coarse sandy loam, gravelly sandy loam	SC-SM, GM-GC, SM, GM	A-2, A-4, A-1-b	0	0-10	60-80	55-75	35-55	20-40	15-30	NP-10
120:												
Bresser---------	0-15	Sandy loam	SM	A-2-4, A-4	0	0	95-100	95-100	70-80	30-40	15-25	NP-5
	15-37	Sandy clay loam, clay loam	CL, SC	A-6	0	0	95-100	95-100	75-85	40-60	30-40	15-25
	37-60	Loamy coarse sand, gravelly loamy sand	SM	A-1-b, A-2-4	0	0	70-95	65-90	40-75	15-30	---	NP
121:												
Cantle----------	0-16	Loam	CL	A-6	0	0	95-100	90-100	85-90	65-80	30-35	10-15
	16-32	Loam, silt loam	CL	A-6	0	0	95-100	90-100	85-90	65-80	30-35	10-15
	32-60	Silt loam, loam	CL	A-6	0	0	95-100	95-100	85-90	65-80	30-35	10-15
122*:												
Cantle----------	0-10	Loam	CL	A-6	0	0	95-100	90-100	85-90	65-80	30-35	10-15
	10-36	Loam	CL	A-6	0	0	95-100	90-100	85-90	65-80	30-35	10-15
	36-60	Gravelly sandy loam	GM-GC	A-1, A-2-4	0	0-10	60-85	50-75	35-55	15-35	20-25	5-10
Merden, saline--	0-15	Silty clay loam	CL	A-6	0	0	100	95-100	90-100	75-85	35-40	15-20
	15-23	Silty clay loam	CL	A-7	0	0	100	95-100	90-100	75-85	40-45	20-25
	23-60	Silty clay loam	CL	A-6	0	0	100	95-100	90-100	75-85	35-40	15-20

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
123*:												
Cathedral-------	0-7	Gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0-5	65-80	60-75	45-55	25-40	15-25	NP-10
	7-13	Very gravelly sandy loam, extremely gravelly sandy loam, very channery loam	GM-GC, GM, GP-GM	A-2, A-1	0	0-10	20-55	15-50	10-35	5-30	15-25	NP-10
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Boyle-----------	0-7	Gravelly loam	SC-SM, CL-ML, SM, ML	A-4	0	0-5	90-95	65-80	55-60	40-55	15-30	NP-10
	7-15	Very gravelly sandy clay loam, very gravelly loam	GC	A-2	0	0-5	40-65	35-55	25-45	15-30	30-35	15-20
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
124*:												
Chalkcreek Family---------	0-6	Loam	CL	A-6	0	0	100	100	95-100	75-85	25-30	10-15
	6-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	75-90	30-35	10-15
	30-60	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	75-90	30-35	10-15
125*:												
Chalkcreek------	0-6	Loam	CL	A-6	0	0	100	100	95-100	75-85	25-30	10-15
	6-23	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	75-90	25-40	10-20
	23-60	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	75-90	25-30	10-15
Tieside---------	0-3	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-95	55-75	20-30	5-15
	3-19	Loam	CL	A-6	0	0	95-100	90-100	75-95	55-75	25-30	10-15
	19	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
126:												
Chivington------	0-3	Loam	CL	A-6	0	0	100	100	85-95	60-75	30-35	10-15
	3-29	Clay	CH	A-7	0	0	100	100	90-95	70-85	50-65	25-40
	29-60	Clay	CH	A-7	0	0	100	100	90-100	70-85	50-65	25-40
127:												
Cowestglen------	0-7	Fine sandy loam	SC-SM, SC	A-2-4, A-4	0	0	100	95-100	80-85	30-50	20-25	5-10
	7-54	Stratified coarse sandy loam to silty clay loam	SC-SM, SC	A-2-4, A-4	0	0	100	95-100	65-70	25-45	20-25	5-10
	54-60	Stratified loamy sand to clay loam	SC-SM, SC	A-2-4, A-4	0	0	100	95-100	70-75	30-50	20-25	5-10

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
128*:												
Dalecreek-------	0-10	Loam	SC	A-6	0	0	95-100	85-100	65-75	35-50	25-30	10-15
	10-60	Gravelly sandy clay loam	SC	A-6, A-2	0	0-5	75-80	60-75	45-60	25-40	30-35	15-20
Kovich, cool----	0-4	Loam	CL	A-6	0	0	100	95-100	75-90	50-75	25-35	10-15
	4-24	Loam	CL	A-6	0	0	100	95-100	75-90	50-75	25-35	10-15
	24-60	Gravelly sandy clay loam, gravelly loam	SC	A-6, A-2	0	0-5	80-90	50-75	40-60	25-50	30-40	15-20
129*:												
Dix-------------	0-10	Gravelly loam	GM, SM	A-4	0	0	60-80	55-75	50-70	40-50	15-20	NP-5
	10-15	Very gravelly sand, extremely gravelly sand	GM, GP-GM	A-1	0	0-10	35-55	25-50	25-40	5-15	---	NP
	15-60	Extremely gravelly coarse sand, extremely gravelly sand, very gravelly sand	GW-GM, GP-GM	A-1	0	15-35	30-50	25-45	20-30	5-10	---	NP
Altvan----------	0-8	Loam	CL-ML	A-4	0	0	100	100	85-95	60-70	25-30	5-10
	8-24	Sandy clay loam	CL, SC	A-6	0	0	100	100	90-95	40-60	25-40	10-20
	24-60	Very gravelly sand	GW-GM, GM, GP-GM	A-1	0	0	35-55	30-50	20-35	5-15	---	NP
130:												
Embry-----------	0-10	Loamy fine sand	SM	A-2-4	0	0	75-100	75-100	55-80	15-30	---	NP
	10-27	Sandy loam, fine sandy loam	SM	A-2-4	0	0	75-100	75-100	60-85	20-35	15-25	NP-5
	27-60	Sandy loam, fine sandy loam	SM	A-2-4	0	0	75-100	75-100	60-80	20-35	15-25	NP-5
131:												
Evanston--------	0-3	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	3-15	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	15-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15
132*:												
Evanston--------	0-5	Gravelly sandy loam	SC-SM, SM	A-2-4, A-4	0	0	90-100	70-75	55-70	25-40	15-30	NP-10
	5-15	Gravelly clay loam	CL	A-7	0	0	90-100	70-75	55-65	55-60	40-50	20-25
	15-27	Gravelly sandy clay loam	SC	A-2-6, A-6	0	0	90-100	70-75	45-55	30-50	30-35	10-15
	27-60	Gravelly sandy clay loam	SC	A-2-6, A-6	0	0	90-100	70-75	45-55	30-45	30-35	10-15

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
132*:												
Weed------------	0-5	Sandy loam	SC-SM	A-2, A-4	0	0	95-100	90-100	65-80	30-50	25-30	5-10
	5-14	Sandy clay loam, clay loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-95	45-70	35-45	15-20
	14-28	Clay loam, sandy clay loam	CL, SC	A-7, A-6	0	0	90-100	85-95	75-95	45-70	35-45	15-20
	28-60	Sandy clay loam, gravelly sandy clay loam	SC	A-6	0	0	75-100	70-90	60-80	35-50	30-40	10-15
133*:												
Evanston--------	0-3	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	3-12	Clay loam	CL	A-6	0	0	95-100	95-100	70-90	60-75	25-40	10-20
	12-27	Loam	CL	A-6	0	0	95-100	95-100	85-95	50-65	25-35	10-15
	27-60	Gravelly sandy loam	SC-SM, SM	A-2-4, A-1-b	0	0	80-90	65-75	45-55	20-35	<30	NP-10
Weed------------	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-95	55-70	25-35	5-15
	8-18	Sandy clay loam, clay loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-95	45-70	35-45	15-20
	18-26	Clay loam, sandy clay loam	CL, SC	A-7, A-6	0	0	90-100	85-95	75-95	45-70	35-45	15-20
	26-60	Sandy clay loam, gravelly sandy clay loam	SC	A-6	0	0	75-100	70-90	60-80	35-50	30-40	10-15
Trimad----------	0-8	Loam	CL-ML	A-4	0	0	95-100	90-100	70-85	65-75	20-30	5-10
	8-60	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
134*:												
Evanston--------	0-7	Loam	CL, CL-ML	A-4	0	0	100	100	85-90	60-70	25-35	5-10
	7-17	Sandy clay loam	CL	A-6	0	0	100	100	85-95	50-60	25-40	10-20
	17-30	Sandy clay loam	CL	A-6	0	0	100	100	85-95	50-60	25-40	10-20
	30-60	Gravelly sandy clay loam	SC	A-6	0	0	80-85	70-75	55-65	35-45	30-40	10-15
Ipson-----------	0-8	Loam	CL	A-6	0	0	95-100	95-100	70-85	50-70	25-35	10-15
	8-22	Very gravelly sandy clay loam	GC	A-2-6	0	0-5	40-65	35-55	25-45	15-30	30-35	10-15
	22-45	Very gravelly sandy clay loam	GC	A-2-6	0	0-5	40-65	35-55	25-45	15-30	30-35	10-15
	45-60	Very gravelly loam, very gravelly sandy loam	GM, GC, GM-GC	A-1, A-2-4	0	0-30	35-75	25-50	15-35	5-25	15-25	NP-10
135*:												
Haverdad--------	0-7	Sandy clay loam	CL, SC	A-6	0	0	95-100	95-100	80-90	40-60	30-40	10-15
	7-30	Stratified loamy sand to sandy clay loam	CL, SC	A-6	0	0	95-100	90-100	65-90	45-65	30-40	10-15
	30-60	Very gravelly sand	GP, GP-GM, SP	A-1	0	0-10	30-60	25-50	15-30	0-10	---	NP

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
135*:												
Clarkelen--------	0-8	Sandy loam	SC-SM	A-2, A-4	0	0	100	95-100	70-80	30-50	25-30	5-10
	8-37	Stratified loamy sand to sandy loam	SM, SC-SM	A-2, A-4	0	0	80-95	75-90	55-70	25-45	15-30	NP-10
	37-60	Stratified very gravelly sand to gravelly sandy loam	SM	A-1-b, A-2-4	0	0-5	70-85	65-75	45-55	15-25	15-25	NP-5
Kovich, warm----	0-11	Loam	CL	A-6	0	0	100	95-100	75-90	50-75	30-35	10-15
	11-26	Stratified fine sandy loam to silt loam	CL	A-6	0	0	100	95-100	75-90	60-75	30-35	10-15
	26-60	Stratified fine sandy loam to silt loam	CL	A-6	0	0	90-100	90-100	75-90	60-75	30-35	10-15
136:												
Haverson--------	0-12	Loam	CL-ML	A-4	0	0	95-100	95-100	85-90	60-75	20-30	5-10
	12-60	Stratified clay loam to sand	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	95-100	75-100	65-90	45-60	25-35	5-15
137*:												
Ipson-----------	0-3	Gravelly loam	SC-SM	A-2, A-4	0	0-5	80-90	50-70	35-50	25-45	20-28	5-10
	3-12	Very gravelly sandy clay loam, very gravelly loam	GC	A-2-6, A-6	0	0-5	45-65	35-50	30-45	25-40	25-35	10-15
	12-60	Very gravelly sandy loam	GM, GM-GC, GP-GM, SM	A-1, A-2-4	0	0-30	35-75	25-50	15-35	5-20	15-25	NP-10
Breece, dry-----	0-5	Sandy loam	SC-SM	A-4	0	0	95-100	85-100	65-80	35-45	25-30	5-10
	5-25	Gravelly sandy loam	SC-SM, SM	A-4, A-2	0	0-5	70-80	65-75	50-60	30-40	15-30	NP-10
	25-60	Gravelly coarse sandy loam, gravelly sandy loam	SC-SM, GM-GC, SM, GM	A-2, A-4, A-1-b	0	0-10	60-80	55-75	35-55	20-40	15-30	NP-10
Evanston--------	0-7	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	7-19	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	19-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15
138*:												
Ipson-----------	0-8	Gravelly loam	SC-SM	A-2, A-4	0	0-5	80-90	50-70	35-50	25-45	20-28	5-10
	8-14	Very gravelly sandy clay loam, very gravelly loam	GC	A-2-6, A-6	0	0-5	45-65	35-50	30-45	25-40	25-35	10-15
	14-60	Very gravelly sandy loam	GM, GM-GC, GP-GM, SM	A-1, A-2-4	0	0-30	35-75	25-50	15-35	5-20	15-25	NP-10
Evanston--------	0-7	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	7-28	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	28-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
139*:												
Ipson-----------	0-8	Gravelly loam	SC-SM	A-2, A-4	0	0-5	80-90	50-70	35-50	25-45	20-28	5-10
	8-14	Very gravelly sandy clay loam, very gravelly loam	GC	A-2-6, A-6	0	0-5	45-65	35-50	30-45	25-40	25-35	10-15
	14-60	Very gravelly sandy loam	GM, GM-GC, GP-GM, SM	A-1, A-2-4	0	0-30	35-75	25-50	15-35	5-20	15-25	NP-10
Evanston---------	0-9	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	9-26	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	26-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
140*:												
Ipson-----------	0-9	Loam	CL	A-6	0	0	95-100	95-100	70-85	50-70	25-35	10-15
	9-26	Very gravelly sandy clay loam	GC	A-2-6	0	0-5	40-65	35-55	25-45	15-30	30-35	10-15
	26-40	Very gravelly sandy clay loam	GC	A-2-6	0	0-5	40-65	35-55	25-45	15-30	30-35	10-15
	40-60	Very gravelly loam, very gravelly sandy loam	GM, GC, GM-GC	A-1, A-2-4	0	0-30	35-75	25-50	15-35	5-25	15-25	NP-10
Pinelli----------	0-7	Loam	CL	A-6	0	0	95-100	95-100	85-95	60-75	25-35	10-15
	7-18	Clay loam, clay	CL	A-6, A-7	0	0	95-100	95-100	85-95	60-85	35-50	15-30
	18-60	Clay loam, sandy clay loam	CL	A-6	0	0	95-100	95-100	90-95	50-75	30-40	10-20
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
141*:												
Ipson-----------	0-7	Loam	CL	A-6	0	0	95-100	95-100	70-85	50-70	25-35	10-15
	7-13	Very gravelly sandy clay loam, very gravelly loam	GC	A-2-6, A-6	0	0-5	45-65	35-50	30-45	25-40	25-35	10-15
	13-60	Very gravelly sandy loam	GM, GM-GC, GP-GM, SM	A-1, A-2-4	0	0-30	35-75	25-50	15-35	5-20	15-25	NP-10
Trimad-----------	0-10	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	10-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
142:												
Manter-----------	0-7	Sandy loam	SM, SC-SM,	A-2, A-4	0	0	80-100	75-100	55-75	25-45	15-25	NP-10
	7-19	Fine sandy loam, sandy loam, loam	SC-SM, CL-ML	A-4	0	0	85-100	80-100	70-85	40-60	20-25	5-10
	19-23	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10
	23-60	Sandy loam, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
143:												
Manter----------	0-7	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10
	7-15	Fine sandy loam, sandy loam, loam	SC-SM, CL-ML	A-4	0	0	85-100	80-100	70-85	40-60	20-25	5-10
	15-60	Sandy loam, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10
144*:												
Manter----------	0-8	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10
	8-20	Fine sandy loam, sandy loam, loam	SC-SM, CL-ML	A-4	0	0	85-100	80-100	70-85	40-60	20-25	5-10
	20-32	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10
	32-60	Sandy loam, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	80-100	75-100	65-85	30-50	15-25	NP-10
Treon-----------	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	8-18	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	18	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
145:												
Merden----------	0-12	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-95	30-35	15-20
	12-24	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-95	35-45	15-25
	24-60	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-95	35-40	15-20
146*:												
Merden, cool----	0-10	Silty clay loam	CL	A-6	0	0	100	95-100	90-100	75-85	35-40	15-20
	10-19	Silty clay loam	CL	A-7	0	0	100	95-100	90-100	75-85	40-45	20-25
	19-60	Silty clay loam	CL	A-6	0	0	100	95-100	90-100	75-85	35-40	15-20
Kovich----------	0-4	Loam	CL	A-6	0	0	100	95-100	75-90	50-75	25-35	10-15
	4-24	Loam	CL	A-6	0	0	100	95-100	75-90	50-75	25-35	10-15
	24-60	Gravelly sandy clay loam, gravelly loam	SC	A-6, A-2	0	0-5	80-90	50-75	40-60	25-50	30-40	15-20
147:												
Mitchell--------	0-6	Silt loam	CL-ML	A-4	0	0	95-100	95-100	90-100	80-90	20-30	5-10
	6-60	Silt loam	CL-ML	A-4	0	0	95-100	95-100	90-100	80-90	20-30	5-10
148:												
Moskee----------	0-7	Fine sandy loam	SM, SC-SM	A-4	0	0	95-100	90-100	75-85	35-50	15-30	NP-10
	7-16	Sandy clay loam	CL, SC	A-6	0	0	95-100	90-100	80-90	40-60	30-40	10-20
	16-60	Sandy loam, fine sandy loam, sandy clay loam	SC-SM, SC, SM	A-2, A-4, A-6	0	0	85-100	85-100	70-85	30-50	15-35	NP-15
149:												
Nucla-----------	0-7	Loam	CL-ML	A-4	0	0	95-100	90-100	75-85	55-70	25-30	5-10
	7-16	Loam	CL-ML	A-4	0	0	95-100	90-100	75-85	55-70	25-30	5-10
	16-28	Loam	CL-ML	A-4	0	0	95-100	90-100	75-85	55-70	25-30	5-10
	28-60	Fine sandy loam	SC-SM	A-4, A-2	0	0	85-95	75-80	65-70	30-50	25-30	5-10

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
150:												
Otero	0-7	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	95-100	95-100	70-85	30-50	15-25	NP-10
	7-60	Fine sandy loam	SC-SM	A-2, A-4	0	0	95-100	95-100	70-85	30-50	20-25	5-10
151*:												
Otero	0-7	Fine sandy loam	SM, SC-SM	A-2, A-4	0	0	95-100	95-100	70-85	30-50	15-25	NP-10
	7-60	Fine sandy loam	SC-SM	A-2, A-4	0	0	95-100	95-100	70-85	30-50	20-25	5-10
Valent	0-10	Loamy fine sand	SM	A-2, A-4	0	0	100	100	90-95	30-40	---	NP
	10-60	Loamy fine sand	SM	A-2, A-4	0	0	100	100	90-95	30-40	---	NP
Tassel	0-7	Fine sandy loam	SM	A-4	0	0	95-100	90-100	75-85	40-50	15-25	NP-5
	7-12	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-80	40-50	15-25	NP-5
	12	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
152:												
Paoli	0-18	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
	18-23	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
	23-60	Fine sandy loam, sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
153:												
Paoli	0-13	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
	13-21	Fine sandy loam, sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
	21-60	Fine sandy loam, sandy loam	CL-ML, SC-SM	A-4	0	0	95-100	95-100	80-90	40-60	20-25	5-10
154:												
Peetz	0-4	Gravelly sandy loam	SM	A-1, A-2	0	0-5	75-95	50-75	25-45	15-30	---	NP
	4-60	Very gravelly sand, very gravelly loamy sand	GP, GP-GM	A-1	0	0-10	35-45	30-40	15-20	0-10	---	NP
155*:												
Peetz	0-4	Gravelly sandy loam	SM	A-1, A-2	0	0-5	75-95	50-75	25-45	15-30	---	NP
	4-8	Very gravelly sandy loam, gravelly coarse sandy loam	SM, GM	A-1, A-2	0	0-5	50-75	30-75	20-45	10-30	---	NP
	8-60	Very gravelly sand, very gravelly loamy sand	GP, GP-GM	A-1	0	0-10	35-45	30-40	15-20	0-10	---	NP
Altvan	0-3	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	100	100	80-90	40-60	25-30	5-10
	3-19	Sandy clay loam, clay loam, loam	CL	A-6	0	0	100	100	90-95	60-80	25-35	10-15
	19-60	Gravelly coarse sand, gravelly sand	SP-SM	A-1	0	0	60-70	50-60	30-45	5-10	---	NP

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
156:												
Pinelli---------	0-3	Loam	CL	A-6	0	0	95-100	95-100	85-95	60-75	25-35	10-15
	3-30	Clay loam, clay	CL	A-6, A-7	0	0	95-100	95-100	85-95	60-85	35-50	15-30
	30-60	Clay loam, sandy clay loam	CL	A-6	0	0	95-100	95-100	90-95	50-75	30-40	10-20
157*:												
Pinelli---------	0-4	Clay loam	CL	A-6	0	0	95-100	90-100	80-90	60-80	35-40	15-20
	4-23	Clay loam, clay	CL	A-6, A-7	0	0	95-100	95-100	85-95	60-85	35-50	15-30
	23-60	Clay loam, sandy clay loam	CL	A-6	0	0	95-100	95-100	90-95	50-75	30-40	10-20
Chivington------	0-10	Loam	CL	A-6	0	0	100	100	85-95	60-75	30-35	10-15
	10-23	Clay loam, clay	CH, CL	A-7	0	0	100	100	85-95	60-80	45-55	25-35
	23-60	Gravelly clay loam	CL, SC	A-7	0	0	70-90	60-75	55-75	45-65	40-50	15-25
158:												
Poposhia--------	0-6	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	6-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
159*:												
Poposhia--------	0-10	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	10-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
Blazon----------	0-6	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	6-13	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
160*:												
Poposhia--------	0-4	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	4-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
Blazon, thin solum----------	0-3	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	3-9	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	9	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
161*:												
Poposhia--------	0-6	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	6-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
Piezon----------	0-4	Silt loam	CL-ML	A-4	0	0	100	100	85-95	80-90	25-30	5-10
	4-13	Silt loam	CL-ML	A-4	0	0	100	100	90-95	85-95	25-30	5-10
	13-23	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	85-95	25-35	5-15
	23	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
162*:												
Poposhia--------	0-7	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	7-25	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	25-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
162*:												
Trimad----------	0-3	Loam	CL-ML	A-4	0	0	95-100	90-100	70-85	65-75	20-30	5-10
	3-10	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	10-34	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
	34-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
163*:												
Redthayne-------	0-8	Channery loam	GM-GC, GC, SC-SM, SC	A-4, A-6	0	0-5	60-85	50-75	40-70	35-55	25-35	5-15
	8-14	Very channery loam, very channery clay loam	GC	A-2, A-6	0-5	5-15	40-55	35-50	30-45	25-40	25-40	10-20
	14-60	Very channery loam	GM-GC, GC	A-2, A-1-b	0-5	5-15	30-55	25-50	20-40	15-35	25-35	5-15
Tyzak, thin solum----------	0-4	Channery loam	SC, GC, CL	A-6	0	0-5	60-85	50-75	45-65	35-60	25-30	10-15
	4-8	Very channery loam, very gravelly loam, extremely channery loam	GC	A-2, A-6	0	5-15	30-65	25-55	20-45	15-40	25-30	10-15
	8	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Evanston--------	0-3	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	3-26	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	26-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15
164*:												
Redthayne-------	0-8	Channery loam	GM-GC, GC, SC-SM, SC	A-4, A-6	0	0-5	60-85	50-75	40-70	35-55	25-35	5-15
	8-14	Very channery loam, very channery clay loam	GC	A-2, A-6	0-5	5-15	40-55	35-50	30-45	25-40	25-40	10-20
	14-60	Very channery loam	GM-GC, GC	A-2, A-1-b	0-5	5-15	30-55	25-50	20-40	15-35	25-35	5-15
Tyzak-----------	0-7	Channery loam	SC, GC, CL	A-6	0	0-5	60-85	50-75	45-65	35-60	25-30	10-15
	7-15	Very channery loam, very gravelly loam, extremely channery loam	GC	A-2, A-6	0	5-15	30-65	25-55	20-45	15-40	25-30	10-15
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
165*:												
Riverwash-------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
166*:												
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
166*:												
Blazon, thin solum----------	0-9	Gravelly silt loam	CL-ML	A-4	0	0	65-80	60-75	55-70	50-60	25-30	5-10
	9	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
167*:												
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Cathedral-------	0-7	Gravelly loam	SC-SM, SM	A-4	0	0-5	85-95	60-70	50-60	40-50	15-30	NP-10
	7-13	Very gravelly sandy loam, extremely gravelly sandy loam, very channery loam	GM-GC, GM, GP-GM	A-2, A-1	0	0-10	20-55	15-50	10-35	5-30	15-25	NP-10
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
168*:												
Taluce----------	0-6	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	35-50	20-30	NP-5
	6-17	Sandy loam, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	95-100	90-100	60-80	25-50	15-25	NP-10
	17	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Taluce, thin solum----------	0-6	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	35-50	20-30	NP-5
	6	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
169*:												
Taluce----------	0-6	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	35-50	20-30	NP-5
	6-17	Sandy loam, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	95-100	90-100	60-80	25-50	15-25	NP-10
	17	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Taluce, thin solum----------	0-3	Fine sandy loam	SM	A-4	0	0	95-100	90-100	70-85	35-50	20-30	NP-5
	3-7	Sandy loam, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	95-100	90-100	60-80	25-50	15-25	NP-10
	7	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Turnercrest-----	0-6	Fine sandy loam	SM	A-2, A-4	0	0	100	100	60-80	30-45	---	NP
	6-28	Sandy loam, fine sandy loam	SM	A-2, A-4	0	0	100	100	60-80	30-45	15-25	NP-5
	28	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
170*:												
Tieside, north slopes----------	0-4	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-95	55-75	20-30	5-15
	4-12	Loam	CL	A-6	0	0	95-100	90-100	75-95	55-75	25-30	10-15
	12	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
171*:												
Treon------------	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	8-16	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Aberone----------	0-7	Fine sandy loam	SM	A-4	0	0	90-100	90-100	60-80	35-45	---	NP
	7-16	Sandy loam, fine sandy loam	SM, SC-SM	A-4	0	0	90-100	90-100	60-80	35-45	15-30	NP-10
	16-60	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, GM-GC	A-1, A-2	0	25-45	30-60	15-50	10-45	5-35	15-30	NP-10
172*:												
Treon------------	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	8-16	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Aberone----------	0-7	Fine sandy loam	SM	A-4	0	0	90-100	90-100	60-80	35-45	---	NP
	7-16	Sandy loam, fine sandy loam	SC-SM, SM	A-4	0	0	90-100	90-100	60-80	35-45	15-30	NP-10
	16-60	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, GM-GC	A-1, A-2	0	25-45	30-60	15-50	10-45	5-35	15-30	NP-10
Treon, thin solum-----------	0-4	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	4-7	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	7	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
173*:												
Treon, dry-------	0-7	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	7-13	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
173*:												
Aberone----------	0-4	Fine sandy loam	SM	A-4	0	0	90-100	90-100	60-80	35-45	---	NP
	4-14	Sandy loam, fine sandy loam	SM, SC-SM	A-4	0	0	90-100	90-100	60-80	35-45	15-30	NP-10
	14-60	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam	GM, GP-GM, GM-GC	A-1, A-2	0	25-45	30-60	15-50	10-45	5-35	15-30	NP-10
174*:												
Treon, thin solum----------	0-6	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	6	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Treon-----------	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	8-16	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
175*:												
Treon, dry------	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	8-13	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	13	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Bayard----------	0-12	Fine sandy loam	SM, SC-SM	A-4	0	0	85-100	80-100	70-85	35-50	15-25	NP-10
	12-23	Fine sandy loam, very fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	85-100	80-100	70-95	35-60	15-25	NP-10
	23-60	Fine sandy loam, loamy very fine sand	SM, SC-SM	A-4	0	0	85-100	80-100	70-95	35-50	15-25	NP-10
176*:												
Trimad----------	0-8	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	8-13	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	13-37	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
	37-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
Blazon----------	0-4	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	4-14	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	14	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
177*:												
Trimad	0-7	Loam	CL-ML	A-4	0	0	95-100	90-100	70-85	65-75	20-30	5-10
	7-25	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	25-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
Blazon, thin solum	0-4	Silt loam	CL-ML	A-4	0	0	100	100	95-100	85-95	25-30	5-10
	4-8	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	8	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
178*:												
Trimad	0-8	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	8-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
Evanston	0-8	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	8-23	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	23-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15
179*:												
Trimad, dry	0-8	Loam	CL-ML	A-4	0	0	95-100	90-100	70-85	65-75	20-30	5-10
	8-13	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	13-37	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
	37-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
Poposhia, dry	0-6	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	6-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
180*:												
Trimad	0-8	Loam	CL-ML	A-4	0	0	95-100	90-100	70-85	65-75	20-30	5-10
	8-14	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	14-60	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
Weed	0-3	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-95	55-75	25-35	5-15
	3-9	Sandy clay loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-90	35-60	35-45	15-20
	9-27	Sandy clay loam, clay loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-90	45-60	35-45	15-20
	27-60	Loam, sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-6	0	0	95-100	90-100	70-95	40-60	25-35	5-15
Blazon	0-2	Gravelly silt loam	CL-ML	A-4	0	0	65-80	60-75	55-70	50-60	25-30	5-10
	2-15	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-80	25-35	5-15
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
181*:												
Tyzak-----------	0-7	Channery loam	SC, GC, CL	A-6	0	0-5	60-85	50-75	45-65	35-60	25-30	10-15
	7-15	Very channery loam, very gravelly loam, extremely channery loam	GC	A-2, A-6	0	5-15	30-65	25-55	20-45	15-40	25-30	10-15
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Tyzak, thin solum----------	0-7	Very channery loam	GC	A-2, A-6	0	5-15	45-65	40-55	30-45	25-40	25-30	10-15
	7	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
182*:												
Urban land.												
Albinas---------	0-4	Loam	ML, CL-ML	A-4	0	0	100	95-100	80-100	50-75	15-30	NP-10
	4-30	Sandy clay loam, clay loam	SC, CL	A-6	0	0	100	95-100	80-100	40-80	30-40	10-20
	30-60	Loam	CL-ML	A-4	0	0	100	95-100	60-95	50-75	20-30	5-10
183*:												
Urban land.												
Altvan----------	0-4	Loam	CL-ML	A-4	0	0	100	100	85-95	60-70	25-30	5-10
	4-20	Sandy clay loam	CL, SC	A-6	0	0	100	100	90-95	40-60	25-40	10-20
	20-60	Very gravelly sand	GW-GM, GM, GP-GM	A-1	0	0	35-55	30-50	20-35	5-15	---	NP
184*:												
Urban land.												
Ascalon---------	0-8	Loam	CL	A-6	0	0	100	100	90-95	65-75	25-35	10-15
	8-24	Sandy clay loam, clay loam	CL, SC	A-6	0	0	100	100	90-95	45-65	25-40	10-20
	24-60	Loam	CL	A-6	0	0	90-100	85-100	80-95	55-75	25-35	10-15
185*:												
Urban land.												
Bayard----------	0-10	Fine sandy loam	SM, SC-SM	A-4	0	0	85-100	80-100	70-85	35-50	15-25	NP-10
	10-29	Fine sandy loam, very fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	85-100	80-100	70-95	35-60	15-25	NP-10
	29-60	Fine sandy loam, loamy very fine sand	SM, SC-SM	A-4	0	0	85-100	80-100	70-95	35-50	15-25	NP-10
186*:												
Urban land.												

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
186*:												
Evanston	0-3	Loam	CL-ML	A-4	0	0	95-100	95-100	70-85	50-70	25-30	5-10
	3-15	Loam, clay loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	55-70	25-40	10-20
	15-60	Loam, sandy clay loam	CL	A-6	0	0	100	95-100	85-95	50-65	25-35	10-15
187*:												
Urban land.												
Merden	0-12	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-95	30-35	15-20
	12-24	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-95	35-45	15-25
	24-60	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-95	35-40	15-20
188*:												
Urban land.												
Poposhia	0-6	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	6-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
189*:												
Urban land.												
Poposhia	0-6	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
	6-60	Silt loam	CL	A-6	0	0	95-100	95-100	90-100	70-85	30-35	10-15
Trimad	0-3	Loam	CL	A-6	0	0	95-100	90-100	85-90	65-80	30-35	10-15
	3-10	Gravelly loam	SC-SM	A-2, A-4	0	0-5	85-95	50-70	40-55	25-45	20-30	5-10
	10-34	Very gravelly loam	SC-SM, GM-GC	A-2, A-1	0	0-35	40-75	35-50	30-40	20-35	20-30	5-10
	34-60	Very gravelly sandy loam	SC-SM, GM-GC	A-1, A-2-4	0	0-30	40-75	35-50	30-40	15-25	20-25	5-10
190:												
Valent	0-10	Loamy fine sand	SM	A-2, A-4	0	0	100	100	90-95	30-40	0-14	NP
	10-60	Loamy fine sand	SM	A-2, A-4	0	0	100	100	90-95	30-40	0-14	NP
191*:												
Valent	0-8	Loamy fine sand	SM	A-2, A-4	0	0	100	100	90-95	30-40	---	NP
	8-60	Loamy fine sand	SM	A-2, A-4	0	0	100	100	90-95	30-40	---	NP
Treon	0-7	Fine sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	7-15	Fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2	0	0	75-100	75-100	55-95	25-50	20-30	NP-10
	15	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
192:												
Vetal	0-10	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	85-90	35-50	<25	NP-10
	10-27	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	85-90	35-50	<25	NP-10
	27-60	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	85-90	35-50	<25	NP-10
193:												
Vetal	0-6	Loamy fine sand	SM	A-4	0	0	100	100	90-95	35-45	<20	NP-5
	6-32	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	85-90	35-50	<25	NP-10
	32-60	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	85-90	35-50	<25	NP-10

See footnote at end of table.

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
194:												
Vonalee---------	0-6	Fine sandy loam	SM	A-4	0	0	100	100	85-95	35-50	15-25	NP-5
	6-24	Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	85-95	35-50	15-25	NP-10
	24-60	Sandy loam	SM	A-2, A-4	0	0	100	95-100	70-80	25-45	15-25	NP-5
195:												
Wages-----------	0-7	Loam	CL-ML	A-4	0	0	95-100	95-100	80-90	50-75	25-30	5-10
	7-13	Clay loam	CL	A-6	0	0	95-100	95-100	85-95	65-85	30-35	10-15
	13-60	Sandy loam, loam	SC-SM	A-4	0	0	95-100	95-100	70-80	35-50	20-25	5-10
196:												
Weed------------	0-6	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-95	55-75	25-35	5-15
	6-14	Sandy clay loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-90	35-60	35-45	15-20
	14-28	Sandy clay loam, clay loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-90	45-60	35-45	15-20
	28-60	Sandy clay loam, loam	SC, CL	A-6, A-7	0	0	90-100	85-95	75-90	35-60	35-45	15-20

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
100--------------- Albinas	0-3	15-20	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low--------	0.24	5	5	3-6
	3-25	20-35	1.25-1.40	0.6-2.0	0.16-0.19	6.6-7.8	0-2	Moderate	0.24			
	25-60	10-20	1.25-1.40	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.32			
101--------------- Altvan	0-4	15-20	1.25-1.35	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.24	4	5	2-3
	4-24	18-35	1.25-1.40	0.06-2.0	0.14-0.16	7.4-8.4	0-2	Moderate	0.32			
	24-60	0-10	1.45-1.55	>20	0.03-0.04	7.9-8.4	0-2	Low--------	0.05			
102*:												
Altvan-----------	0-8	15-20	1.25-1.35	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.24	4	5	2-3
	8-23	18-25	1.10-1.25	0.6-2.0	0.14-0.16	7.4-7.8	0-2	Moderate	0.28			
	23-27	18-25	1.25-1.40	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
	27-60	0-10	1.45-1.55	>20	0.03-0.04	7.9-8.4	0-2	Low--------	0.05			
Dix---------------	0-11	7-12	1.15-1.25	0.6-2.0	0.12-0.15	7.4-7.8	0-0	Low--------	0.20	3	7	1-2
	11-23	5-10	1.25-1.35	6.0-20	0.05-0.07	7.9-8.4	0-0	Low--------	0.10			
	23-60	2-7	1.50-1.60	>20	0.02-0.04	7.9-8.4	0-0	Low--------	0.05			
103--------------- Ascalon	0-6	5-15	1.20-1.30	2.0-6.0	0.12-0.14	7.4-7.8	0-2	Low--------	0.17	5	3	1-2
	6-21	18-35	1.25-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.20			
	21-60	18-35	1.30-1.40	2.0-6.0	0.10-0.12	7.9-8.4	0-2	Low--------	0.17			
104--------------- Ascalon	0-9	18-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Moderate	0.28	5	5	1-2
	9-26	18-35	1.25-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.32			
	26-60	15-25	1.25-1.40	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
105--------------- Bayard	0-10	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.28	5	3	1-3
	10-29	10-18	1.40-1.50	2.0-6.0	0.13-0.16	7.4-7.8	0-2	Low--------	0.32			
	29-60	10-18	1.40-1.50	2.0-6.0	0.10-0.13	7.4-8.4	0-2	Low--------	0.32			
106--------------- Bayard, wet	0-10	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.32	5	3	1-3
	10-60	10-18	1.35-1.45	2.0-6.0	0.11-0.15	7.4-8.4	0-2	Low--------	0.28			
107*:												
Bayard-----------	0-10	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.28	5	3	1-3
	10-36	10-18	1.40-1.50	2.0-6.0	0.13-0.16	7.4-7.8	0-2	Low--------	0.32			
	36-60	10-18	1.40-1.50	2.0-6.0	0.10-0.13	7.4-8.4	0-2	Low--------	0.32			
Paoli------------	0-21	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.24	5	3	2-4
	21-60	10-18	1.45-1.50	2.0-6.0	0.13-0.15	7.9-8.4	0-2	Low--------	0.24			
108*:												
Blazon-----------	0-6	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.37	2	4L	.5-1
	6-12	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low--------	0.37			
	12	---	---	---	---	---	---	-----------	----			
Blazon, thin solum-----------	0-3	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.37	2	4L	.5-1
	3-7	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low--------	0.37			
	7	---	---	---	---	---	---	-----------	----			
Poposhia---------	0-6	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	6-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
109*:												
Blazon-----------	0-2	18-27	1.05-1.15	0.6-2.0	0.15-0.17	7.9-8.4	0-2	Low--------	0.28	2	7	.5-1
	2-15	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low--------	0.37			
	15	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
109*:												
Chaperton-------	0-9	15-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Low--------	0.32	3	4L	1-2
	9-27	28-35	1.25-1.35	0.6-2.0	0.19-0.21	7.4-8.4	2-4	Moderate	0.32			
	27	---	---	---	---	---	---	-----------	----			
110*:												
Blazon----------	0-2	19-27	1.15-1.25	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.28	2	4L	1-3
	2-13	28-35	1.15-1.25	0.2-0.6	0.19-0.21	7.9-8.4	0-4	High------	0.32			
	13	---	---	---	---	---	---	-----------	----			
Chaperton-------	0-6	15-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Low--------	0.32	3	4L	1-2
	6-18	28-35	1.10-1.20	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Moderate	0.37			
	18-29	28-35	1.25-1.35	0.6-2.0	0.19-0.21	7.4-8.4	2-4	Moderate	0.32			
	29	---	---	---	---	---	---	-----------	----			
Rock outcrop----	0-60	---	---	---	---	---	---	-----------	----	---	8	---
111*												
Blazon----------	0-4	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.37	2	4L	.5-1
	4-12	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low--------	0.37			
	12	---	---	---	---	---	---	-----------	----			
Trimad----------	0-10	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low--------	0.32	3	4L	1-3
	10-60	10-20	1.25-1.30	2.9-6.0	0.07-0.10	7.9-8.4	0-2	Low--------	0.10			
112*:												
Boyle-----------	0-3	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	3-16	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.18			
	16	---	---	---	---	---	---	-----------	----			
Alderon---------	0-4	12-19	1.25-1.35	2.0-6.0	0.10-0.12	6.6-7.3	0-2	Low--------	0.10	3	6	1-3
	4-12	20-35	1.25-1.35	0.6-2.0	0.13-0.15	6.6-7.3	0-2	Moderate	0.32			
	12-33	20-35	1.25-1.35	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.15			
	33	---	---	---	---	---	---	-----------	----			
Cathedral-------	0-7	10-18	1.25-1.35	2.0-6.0	0.08-0.10	6.6-7.3	0-2	Low--------	0.15	1	5	1-2
	7-19	12-18	1.35-1.40	2.0-6.0	0.05-0.08	6.6-7.3	0-2	Low--------	0.05			
	19	---	---	---	---	---	---	-----------	----			
113*:												
Boyle-----------	0-7	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	7-15	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	15-17	2-10	1.45-1.60	6.0-20	0.03-0.06	6.6-7.3	0-2	Low--------	0.02			
	17	---	---	---	---	---	---	-----------	----			
Boyle, thin solum----------	0-2	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	2-8	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	8	---	---	---	---	---	---	-----------	----			
114*:												
Boyle, thin solum----------	0-4	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	4-8	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	8	---	---	---	---	---	---	-----------	----			
Breece----------	0-5	15-20	1.35-1.40	2.0-6.0	0.11-0.14	6.6-7.8	0-2	Low--------	0.20	5	3	2-5
	5-25	13-18	1.40-1.45	2.0-6.0	0.09-0.12	6.6-7.8	0-2	Low--------	0.17			
	25-60	13-18	1.40-1.45	2.0-6.0	0.07-0.09	7.4-7.8	0-2	Low--------	0.10			
Cathedral-------	0-7	10-20	1.10-1.20	0.6-2.0	0.12-0.14	6.6-7.3	0-2	Low--------	0.17	1	7	1-2
	7-13	12-18	1.35-1.40	2.0-6.0	0.05-0.08	6.6-7.3	0-2	Low--------	0.05			
	13	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
115*:												
Boyle, very stony----------	0-3	10-20	1.10-1.25	2.0-6.0	0.07-0.09	6.6-7.3	0-2	Low--------	0.10	2	8	2-4
	3-8	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	8-16	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	16	---	---	---	---	---	---	-----------	-----			
Boyle, thin solum----------	0-3	10-20	1.10-1.25	2.0-6.0	0.13-0.15	661-7.3	0-2	Low--------	0.20	2	7	2-4
	3-9	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	9	---	---	---	---	---	---	-----------	-----			
Lininger---------	0-4	12-20	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low--------	0.28	3	5	3-5
	4-13	20-30	1.25-1.35	0.6-2.0	0.14-0.17	6.6-7.8	0-0	Moderate	0.28			
	13-26	18-35	1.30-1.40	0.6-2.0	0.14-0.17	6.6-7.8	0-0	Moderate	0.28			
	26-38	20-30	1.30-1.40	0.6-2.0	0.11-0.13	6.6-7.8	0-0	Moderate	0.24			
	38	---	---	---	---	---	---	-----------	-----			
116*:												
Boyle------------	0-5	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	5-14	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	14	---	---	---	---	---	---	-----------	-----			
Lininger---------	0-3	12-20	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low--------	0.28	3	5	3-5
	3-9	20-30	1.25-1.35	0.6-2.0	0.14-0.17	6.6-7.8	0-9	Moderate	0.28			
	9-20	18-35	1.30-1.40	0.6-2.0	0.14-0.17	6.6-7.8	0-0	Moderate	0.28			
	20-22	20-30	1.30-1.40	0.6-2.0	0.11-0.13	6.6-7.8	0-0	Moderate	0.24			
	22	---	---	---	---	---	---	-----------	-----			
Boyle, thin solum----------	0-3	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	3-6	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	6	---	---	---	---	---	---	-----------	-----			
117*:												
Boyle------------	0-7	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	7-15	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	15	---	---	---	---	---	---	-----------	-----			
Rock outcrop----	0-60	---	---	---	---	---	0-2	-----------	-----	---	8	---
Cathedral--------	0-7	10-20	1.10-1.20	0.6-2.0	0.12-0.14	6.6-7.3	0-2	Low--------	0.17	1	7	1-2
	7-13	12-18	1.35-1.40	2.0-6.0	0.05-0.08	6.6-7.3	0-2	Low--------	0.05			
	13	---	---	---	---	---	---	-----------	-----			
118*:												
Boyle------------	0-4	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	4-14	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	14	---	---	---	---	---	---	-----------	-----			
Lininger---------	0-4	12-20	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low--------	0.28	3	5	3-5
	4-8	20-30	1.25-1.35	0.6-2.0	0.14-0.17	6.6-7.8	0-0	Moderate	0.28			
	8-15	18-35	1.30-1.40	0.6-2.0	0.11-0.17	6.6-7.8	0-0	Moderate	0.28			
	15-25	20-30	1.30-1.40	0.6-2.0	0.11-0.13	6.6-7.8	0-0	Moderate	0.24			
	25	---	---	---	---	---	---	-----------	-----			
119--------------- Breece	0-4	15-20	1.35-1.40	2.0-6.0	0.11-0.14	6.6-7.8	0-2	Low--------	0.20	5	3	2-5
	4-23	13-18	1.40-1.45	2.0-6.0	0.09-0.12	6.6-7.8	0-2	Low--------	0.17			
	23-60	13-18	1.40-1.45	2.0-6.0	0.07-0.09	7.4-7.8	0-2	Low--------	0.10			
120--------------- Bresser	0-15	8-20	1.35-1.45	2.0-6.0	0.11-0.13	6.1-7.3	0-0	Low--------	0.17	4	3	2-4
	15-37	20-30	1.40-1.50	0.6-2.0	0.15-0.18	6.6-7.3	0-0	Moderate	0.20			
	37-60	3-10	1.50-1.60	6.0-20	0.07-0.09	6.6-7.8	0-0	Low--------	0.05			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
121-------------- Cantle	0-16	20-27	1.15-1.25	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32	5	7	2-3
	16-32	20-27	1.20-1.30	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
	32-60	20-27	1.25-1.35	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
122*:												
Cantle----------	0-10	20-27	1.20-1.30	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32	5	7	1-3
	10-36	20-27	1.25-1.35	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
	36-60	10-18	1.35-1.45	2.0-6.0	0.08-0.10	7.9-8.4	0-2	Low--------	0.10			
Merden, saline--	0-15	30-35	1.05-1.15	0.06-0.2	0.15-0.17	8.5-9.0	4-8	Moderate	0.32	5	7	1-3
	15-23	32-38	1.15-1.25	0.06-0.2	0.15-0.17	8.5-9.0	4-8	High-------	0.32			
	23-60	30-35	1.20-1.30	0.06-0.2	0.15-0.17	8.5-9.0	4-8	Moderate	0.43			
123*:												
Cathedral--------	0-7	10-18	1.25-1.35	2.0-6.0	0.08-0.10	6.6-7.3	0-2	Low--------	0.15	1	5	1-2
	7-13	12-18	1.35-1.40	2.0-6.0	0.05-0.08	6.6-7.3	0-2	Low--------	0.05			
	13	---	---	---	---	---	---	-----------	-----			
Boyle-----------	0-7	10-20	1.10-1.25	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	2	7	2-4
	7-15	22-30	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.3	0-2	Moderate	0.10			
	15	---	---	---	---	---	---	-----------	-----			
124*:												
Chalkcreek Family----------	0-6	20-27	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Moderate	0.32	5	4L	1-2
	6-30	24-35	1.25-1.35	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Moderate	0.32			
	30-60	24-35	1.25-1.35	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
125*:												
Chalkcreek------	0-6	20-27	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Moderate	0.32	5	4L	1-2
	6-23	24-35	1.25-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.32			
	23-60	24-35	1.25-1.35	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Moderate	0.32			
Tieside----------	0-3	10-25	1.15-1.30	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.32	3	4L	.5-1
	3-19	15-25	1.25-1.40	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.32			
	19	---	---	---	---	---	---	-----------	-----			
126-------------- Chivington	0-3	23-27	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Moderate	0.32	5	6	3-5
	3-29	40-60	1.15-1.30	0.06-0.2	0.14-0.16	6.6-4.8	0-2	High-------	0.37			
	29-60	40-65	1.15-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-2	High-------	0.37			
127-------------- Cowestglen	0-7	12-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24	5	3	.5-1
	7-54	12-18	1.35-1.50	2.0-6.0	0.11-0.13	7.4-8.4	2-4	Low--------	0.24			
	54-60	12-18	1.35-1.50	2.0-6.0	0.11-0.13	7.4-8.4	2-4	Low--------	0.24			
128*:												
Dalecreek--------	0-10	15-25	1.10-1.20	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Moderate	0.20	5	5	.5-2
	10-60	18-35	1.30-1.40	0.6-2.0	0.11-0.13	6.6-7.8	0-2	Moderate	0.20			
Kovich, cool----	0-4	15-25	1.10-1.20	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Moderate	0.28	5	7	3-5
	4-24	15-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Moderate	0.28			
	24-60	22-32	1.30-1.40	0.6-2.0	0.11-0.14	7.4-7.8	0-2	Moderate	0.17			
129*:												
Dix--------------	0-10	7-12	1.15-1.25	0.6-2.0	0.12-0.15	7.4-7.8	0-0	Low--------	0.20	3	7	1-2
	10-15	3-8	1.45-1.55	>20	0.03-0.05	7.9-8.4	0-0	Low--------	0.05			
	15-60	2-7	1.50-1.60	>20	0.02-0.04	7.9-8.4	0-0	Low--------	0.05			
Altvan-----------	0-8	15-20	1.25-1.35	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.24	4	5	2-3
	8-24	18-35	1.25-1.40	0.6-2.0	0.14-0.16	7.4-8.4	0-2	Moderate	0.32			
	24-60	0-10	1.45-1.55	>20	0.03-0.04	7.9-8.4	0-2	Low--------	0.05			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
130-----------------	0-10	3-10	1.25-1.35	2.0-6.0	0.11-0.13	6.6-7.8	0-2	Low--------	0.28	5	2	1-2
Embry	10-27	8-18	1.35-1.45	2.0-6.0	0.11-0.13	6.6-7.8	0-2	Low--------	0.32			
	27-60	8-18	1.35-1.45	2.0-6.0	0.11-0.13	7.4-8.4	0-2	Low--------	0.32			
131-----------------	0-3	15-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low--------	0.24	5	6	2-4
Evanston	3-15	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	15-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
132*:												
Evanston----------	0-5	10-18	1.15-1.25	0.6-2.0	0.10-0.12	7.4-7.8	0-0	Low--------	0.15	5	3	1-2
	5-15	28-35	1.15-1.25	0.2-0.6	0.16-0.18	7.4-7.8	0-0	Moderate	0.20			
	15-27	20-35	1.25-1.35	0.6-2.0	0.10-0.12	7.4-7.8	0-0	Moderate	0.15			
	27-60	20-30	1.25-1.35	0.6-2.0	0.10-0.12	7.9-8.4	0-2	Moderate	0.15			
Weed--------------	0-5	15-18	1.15-1.20	0.6-2.0	0.16-0.18	7.4-7.8	0-0	Low--------	0.24	5	3	1-2
	5-14	27-35	1.25-1.40	0.2-0.6	0.19-0.21	7.4-7.8	0-0	Moderate	0.28			
	14-28	27-35	1.25-1.40	0.2-0.6	0.19-0.21	7.4-7.8	0-2	Moderate	0.28			
	28-60	25-35	1.25-1.40	0.6-2.0	0.14-0.16	7.9-8.4	0-2	Moderate	0.28			
133*:												
Evanston----------	0-3	15-27	1.20-1.30	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.24	5	5	2-4
	3-12	28-35	1.25-1.35	0.6-2.0	0.19-0.21	7.4-7.8	0-2	Moderate	0.28			
	12-27	18-27	1.25-1.35	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
	27-60	8-18	1.30-1.40	3.0-6.0	0.08-0.10	7.9-8.4	0-2	Low--------	0.15			
Weed--------------	0-8	15-25	1.15-1.20	0.6-2.0	0.16-0.18	7.4-7.8	0-0	Low--------	0.24	5	5	1-2
	8-18	27-35	1.25-1.40	0.2-0.6	0.19-0.21	7.4-7.8	0-0	Moderate	0.28			
	18-26	27-35	1.25-1.40	0.2-0.6	0.19-0.21	7.4-7.8	0-2	Moderate	0.28			
	26-60	25-35	1.25-1.40	0.6-2.0	0.14-0.16	7.9-8.4	0-2	Moderate	0.28			
Trimad------------	0-8	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low--------	0.32	3	4L	1-3
	8-60	10-20	1.25-1.30	2.0-6.0	0.07-0.10	7.9-8.4	0-2	Low--------	0.10			
134*:												
Evanston----------	0-7	10-18	1.15-1.20	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low--------	0.24	5	5	2-4
	7-17	24-30	1.25-1.40	0.6-2.0	0.14-0.16	7.4-7.8	0-2	Moderate	0.28			
	17-30	24-30	1.25-1.40	0.6-2.0	0.14-0.16	7.9-8.4	0-2	Moderate	0.28			
	30-60	20-30	1.25-1.40	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Moderate	0.24			
Ipson-------------	0-8	15-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low--------	0.28	5	6	2-4
	8-22	20-30	1.30-1.40	0.6-2.0	0.10-0.12	7.4-8.4	0-2	Moderate	0.10			
	22-45	20-30	1.30-1.40	0.6-2.0	0.10-0.12	7.9-8.4	0-2	Moderate	0.10			
	45-60	8-22	1.35-1.45	2.0-6.0	0.05-0.08	7.9-8.4	0-2	Low--------	0.05			
135*:												
Haverdad----------	0-7	20-30	1.10-1.25	0.6-2.0	0.14-0.16	7.9-8.4	0-2	Moderate	0.32	4	5	1-2
	7-30	18-30	1.25-1.45	0.6-2.0	0.14-0.16	7.9-8.4	0-2	Moderate	0.24			
	30-60	0-6	1.50-1.60	6.0-20	0.04-0.06	7.9-8.4	0-2	Low--------	0.05			
Clarkelen---------	0-8	12-18	1.25-1.35	2.0-6.0	0.10-0.13	7.9-8.4	0-0	Low--------	0.24	4	3	1-2
	8-37	10-18	1.35-1.45	2.0-6.0	0.09-0.12	7.9-8.4	0-0	Low--------	0.20			
	37-60	5-15	1.40-1.50	2.0-6.0	0.07-0.09	7.9-8.4	0-0	Low--------	0.17			
Kovich, warm------	0-11	25-25	1.20-1.30	0.6-2.0	0.16-0.28	6.6-7.3	0-2	Moderate	0.28	5	7	3-5
	11-26	18-27	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Moderate	0.28			
	26-60	13-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Moderate	0.32			
136-----------------	0-12	15-27	1.40-1.45	0.6-2.0	0.14-0.18	7.4-8.4	0-2	Low--------	0.24	5	4L	.5-2
Haverson	12-60	18-35	1.35-1.40	0.6-2.0	0.14-0.18	7.4-8.4	0-2	Low--------	0.24			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
137*:												
Ipson-----------	0-3	10-20	1.30-1.40	0.6-2.0	0.12-0.14	6.6-7.8	0-2	Low--------	0.20	5	7	2-4
	3-12	18-27	1.30-1.40	0.6-2.0	0.06-0.09	7.4-8.4	0-2	Moderate	0.10			
	12-60	5-18	1.25-1.35	2.0-6.0	0.05-0.08	7.9-8.4	0-2	Low--------	0.10			
Breece, dry-----	0-5	15-20	1.35-1.40	2.0-6.0	0.11-0.14	6.6-7.8	0-2	Low--------	0.20	5	3	2-5
	5-25	13-18	1.40-1.45	2.0-6.0	0.09-0.12	6.6-7.8	0-2	Low--------	0.17			
	25-60	13-18	1.40-1.45	2.0-6.0	0.07-0.09	7.4-7.8	0-2	Low--------	0.10			
Evanston---------	0-7	15-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low--------	0.24	5	5	2-4
	7-19	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	19-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
138*:												
Ipson-----------	0-8	10-20	1.30-1.40	0.6-2.0	0.12-0.14	6.6-7.8	0-2	Low--------	0.20	5	7	2-4
	8-14	18-27	1.30-1.40	0.6-2.0	0.06-0.09	7.4-8.4	0-2	Moderate	0.10			
	14-60	5-18	1.25-1.35	2.0-6.0	0.05-0.08	7.9-8.4	0-2	Low--------	0.10			
Evanston---------	0-7	15-27	1.25-1.35	0.6-2.0	0.15-2.0	6.6-7.8	0-0	Low--------	0.24	5	5	2-4
	7-28	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	28-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
139*:												
Ipson-----------	0-8	10-20	1.30-1.40	0.6-2.0	0.12-0.14	6.6-7.8	0-2	Low--------	0.20	5	7	2-4
	8-14	18-27	1.30-1.40	0.6-2.0	0.06-0.09	7.4-8.4	0-2	Moderate	0.10			
	14-60	5-18	1.25-1.35	2.0-6.0	0.05-0.08	7.9-8.4	0-2	Low--------	0.10			
Evanston---------	0-9	15-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low--------	0.24	5	5	2-4
	9-26	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	26-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
Rock outcrop----	0-60	---	---	---	---	---	---	----------	----	---	8	---
140*:												
Ipson-----------	0-9	15-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low--------	0.28	5	6	2-4
	9-26	20-30	1.30-1.40	0.6-2.0	0.10-0.12	7.4-8.4	0-2	Moderate	0.10			
	26-40	20-30	1.30-1.40	0.6-2.0	0.10-0.12	7.9-8.4	0-2	Moderate	0.10			
	40-60	8-22	1.35-1.45	2.0-6.0	0.05-0.08	7.9-8.4	0-2	Low--------	0.05			
Pinelli----------	0-7	19-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Moderate	0.32	5	5	1-3
	7-18	35-45	1.20-1.30	0.06-0.2	0.16-0.19	7.4-7.8	0-0	High-------	0.32			
	18-60	20-35	1.25-1.35	0.2-0.6	0.16-0.19	7.9-8.4	0-2	Moderate	0.32			
Rock outcrop----	0-60	---	---	---	---	---	---	----------	----	---	8	---
141*:												
Ipson-----------	0-7	15-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Moderate	0.28	5	6	2-4
	7-13	18-27	1.30-1.40	0.6-2.0	0.06-0.09	7.4-8.4	0-2	Moderate	0.10			
	13-60	5-18	1.25-1.35	2.0-6.0	0.05-0.08	7.9-8.4	0-2	Low--------	0.10			
Trimad-----------	0-10	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.17	3	7	1-3
	10-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low--------	0.10			
142--------------- Manter	0-7	6-16	1.25-1.35	2.0-6.0	0.11-0.13	7.4-7.8	0-0	Low--------	0.24	5	3	2-3
	7-19	10-18	1.35-1.45	2.0-6.0	0.13-0.16	7.4-7.8	0-0	Low--------	0.32			
	19-23	9-18	1.35-1.45	2.0-6.0	0.13-0.15	7.4-7.8	0-0	Low--------	0.32			
	23-60	5-15	1.40-1.50	2.0-6.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.28			
143--------------- Manter	0-7	8-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-0	Low--------	0.28	5	3	2-4
	7-15	10-18	1.35-1.45	2.0-6.0	0.13-0.16	7.4-7.8	0-0	Low--------	0.32			
	15-60	5-15	1.40-1.50	2.0-6.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.28			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
144*:												
Manter----------	0-8	8-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-0	Low--------	0.28	5	3	2-4
	8-20	10-18	1.35-1.45	2.0-6.0	0.13-0.16	7.4-7.8	0-0	Low--------	0.32			
	20-32	9-18	1.35-1.45	2.0-6.0	0.13-0.15	7.4-7.8	0-0	Low--------	0.32			
	32-60	5-15	1.40-1.50	2.0-6.0	0.12-0.14	794-8.4	0-2	Low--------	0.28			
Treon-----------	0-8	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	8-18	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	18	---	---	---	---	---	---	-----------	----			
145-------------- Merden	0-12	27-30	1.05-1.15	0.06-0.2	0.15-0.17	7.9-9.0	4-8	Moderate	0.32	5	7	1-3
	12-24	27-38	1.10-1.20	0.06-0.2	0.15-0.17	7.9-9.0	4-8	Moderate	0.37			
	24-60	27-30	1.20-1.30	0.06-0.2	0.15-0.17	7.9-9.0	4-8	Moderate	0.43			
146*:												
Merden, cool----	0-10	30-35	1.05-1.15	0.06-0.2	0.17-0.19	7.4-8.4	0-2	Moderate	0.32	5	7	1-3
	10-19	32-38	1.15-1.25	0.06-0.2	0.17-0.19	7.4-8.4	0-2	High-------	0.32			
	19-60	30-35	1.20-1.30	0.06-0.2	0.17-0.19	7.9-8.4	0-2	Moderate	0.43			
Kovich----------	0-4	15-25	1.10-1.20	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Moderate	0.28	5	7	3-5
	4-24	15-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Moderate	0.28			
	24-60	22-32	1.30-1.40	0.6-2.0	0.11-0.14	7.4-7.8	0-2	Moderate	0.17			
147-------------- Mitchell	0-6	12-20	1.05-1.15	0.6-2.0	0.19-0.21	7.4-7.8	0-2	Low--------	0.37	5	4L	.5-1
	6-60	12-18	1.10-1.20	0.6-2.0	0.19-0.21	7.4-7.8	0-2	Low--------	0.43			
148-------------- Moskee	0-7	10-18	1.25-1.35	2.0-6.0	0.12-0.15	7.4-7.8	0-2	Low--------	0.24	5	3	2-4
	7-16	20-35	1.25-1.35	0.6-2.0	0.14-0.16	7.4-8.4	0-2	Moderate	0.32			
	16-60	10-25	1.30-1.40	2.0-6.0	0.12-0.15	7.9-8.4	0-2	Low--------	0.28			
149-------------- Nucla	0-7	18-25	1.10-1.20	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.28	5	5	1-2
	7-16	18-25	1.20-1.35	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low--------	0.32			
	16-28	18-25	1.20-1.35	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low--------	0.32			
	28-60	15-25	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-2	Low--------	0.28			
150-------------- Otero	0-7	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.24	5	3	.5-1
	7-60	12-18	1.35-1.45	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
151*:												
Otero-----------	0-7	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.24	5	3	.5-1
	7-60	12-18	1.35-1.45	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
Valent----------	0-10	3-10	1.50-1.60	6.0-20	0.08-0.11	6.6-7.8	0-2	Low--------	0.20	5	2	.5-1
	10-60	3-10	1.50-1.60	6.0-20	0.08-0.11	6.6-7.8	0-2	Low--------	0.20			
Tassel----------	0-7	5-10	1.35-1.45	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24	2	3	.5-1
	7-12	5-10	1.35-1.45	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	12	---	---	---	---	---	---	-----------	----			
152-------------- Paoli	0-18	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.24	5	3	2-4
	18-23	10-18	1.35-1.45	2.0-6.0	0.13-0.15	7.9-8.4	0-2	Low--------	0.24			
	23-60	10-18	1.45-1.50	2.0-6.0	0.13-0.15	7.9-8.4	0-2	Low--------	0.24			
153-------------- Paoli	0-13	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.24	5	3	2-4
	13-21	10-18	1.35-1.45	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	21-60	10-18	1.45-1.50	2.0-6.0	0.13-0.15	7.9-8.4	0-2	Low--------	0.24			
154-------------- Peetz	0-4	5-10	1.40-1.55	2.0-6.0	0.07-0.10	6.6-7.8	0-0	Low--------	0.17	3	8	2-4
	4-60	0-8	1.60-1.70	6.0-20	0.03-0.06	7.4-8.4	0-0	Low--------	0.10			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
155*:												
Peetz-----------	0-4	5-10	1.40-1.55	2.0-6.0	0.07-0.10	6.6-7.8	0-0	Low--------	0.17	3	8	2-4
	4-8	8-18	1.40-1.55	6.0-20	0.06-0.09	7.4-8.4	0-0	Low--------	0.17			
	8-60	0-8	1.60-1.70	6.0-20	0.03-0.06	7.4-8.4	0-0	Low--------	0.10			
Altvan----------	0-3	15-20	1.25-1.35	2.0-6.0	0.14-0.16	7.4-7.8	0-2	Low--------	0.24	4	3	2-3
	3-19	18-35	1.10-1.25	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Moderate	0.28			
	19-60	0-10	1.45-1.55	>20	0.04-0.05	7.9-8.4	0-2	Low--------	0.05			
156-------------- Pinelli	0-3	19-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Moderate	0.32	5	5	1-3
	3-30	35-45	1.20-1.30	0.06-0.2	0.16-0.19	7.4-7.8	0-0	High-------	0.32			
	30-60	20-35	1.25-1.35	0.2-0.6	0.16-0.19	7.9-8.4	0-2	Moderate	0.32			
157*:												
Pinelli---------	0-4	28-35	1.15-1.20	0.6-2.0	0.19-0.21	6.6-7.8	0-0	Moderate	0.28	5	6	1-3
	4-23	35-45	1.20-1.30	0.06-0.2	0.16-0.19	7.4-7.8	0-0	High-------	0.32			
	23-60	20-35	1.25-1.35	0.2-0.6	0.16-0.19	7.9-8.4	0-2	Moderate	0.32			
Chivington------	0-10	23-27	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.8	0-2	Moderate	0.32	5	6	3-5
	10-23	35-45	1.10-1.25	0.06-0.2	0.19-0.21	6.6-7.8	0-2	High-------	0.37			
	23-60	30-40	1.15-1.30	0.2-0.6	0.14-0.16	7.4-8.4	0-2	High-------	0.20			
158-------------- Poposhia	0-6	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	6-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
159*:												
Poposhia--------	0-10	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	10-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
Blazon----------	0-6	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.37	2	4L	.5-1
	6-13	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low--------	0.37			
	13	---	---	---	---	---	---	-----------	----			
160*:												
Poposhia--------	0-4	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	4-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
Blazon, thin solum----------	0-3	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.37	2	4L	.5-1
	3-9	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low--------	0.37			
	9	---	---	---	---	---	---	-----------	----			
Rock outcrop----	0-60	---	---	---	---	---	---	-----------	----	---	8	---
161*:												
Poposhia--------	0-6	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	6-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
Piezon----------	0-4	15-20	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	3	4L	1-2
	4-13	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
	13-23	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
	23	---	---	---	---	---	---	-----------	----			
162*:												
Poposhia--------	0-7	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	7-25	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
	25-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
Trimad----------	0-3	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low--------	0.32	3	4L	1-3
	3-10	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.17			
	10-34	10-20	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low--------	0.10			
	34-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low--------	0.10			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
163*:												
Redthayne--------	0-8	15-27	1.15-1.25	0.6-2.0	0.12-0.14	7.4-7.8	0-0	Low--------	0.17	5	7	1-3
	8-14	18-35	1.30-1.40	0.6-2.0	0.09-0.12	7.4-7.8	0-0	Moderate	0.10			
	14-60	15-27	1.30-1.40	0.6-2.0	0.08-0.10	7.9-9.0	0-0	Low--------	0.10			
Tyzak, thin solum-----------	0-4	18-27	1.10-1.20	0.6-2.0	0.12-0.14	7.4-8.4	0-2	Moderate	0.15	1	7	1-3
	4-8	18-27	1.20-1.40	0.6-2.0	0.05-0.08	7.9-8.4	0-2	Moderate	0.10			
	8	---	---	---	---	---	---	-----------	-----			
Evanston---------	0-3	15-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low--------	0.24	5	5	2-4
	3-26	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	26-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
164*:												
Redthayne--------	0-8	15-27	1.15-1.25	0.6-2.0	0.12-0.14	7.4-7.8	0-0	Low--------	0.17	5	7	1-3
	8-14	18-35	1.30-1.40	0.6-2.0	0.09-0.12	7.4-7.8	0-0	Moderate	0.10			
	14-60	15-27	1.30-1.40	0.6-2.0	0.08-0.10	7.9-9.0	0-0	Low--------	0.10			
Tyzak-------------	0-7	18-27	1.10-1.20	0.6-2.0	0.12-0.14	7.4-8.4	0-2	Moderate	0.15	1	7	1-3
	7-15	18-27	1.20-1.40	0.6-2.0	0.05-0.08	7.9-8.4	0-2	Moderate	0.10			
	15	---	---	---	---	---	---	-----------	-----			
Rock outcrop-----	0-60	---	---	---	---	---	---	-----------	-----	---	8	---
165*:												
Riverwash--------	0-60	---	---	---	---	---	---	Low--------	-----	---	8	<.1
166*:												
Rock outcrop-----	0-60	---	---	---	---	---	---	-----------	-----	---	8	---
Blazon, thin solum-----------	0-9	18-27	1.05-1.15	0.6-2.0	0.15-0.17	7.9-8.4	0-2	Low--------	0.28	2	7	.5-1
	9	---	---	---	---	---	---	-----------	-----			
167*:												
Rock outcrop-----	0-60	---	---	---	---	---	---	-----------	-----	---	8	---
Cathedral--------	0-7	10-20	1.10-1.20	0.6-2.0	0.12-0.14	6.6-7.3	0-2	Low--------	0.17	1	7	1-2
	7-13	12-18	1.35-1.40	2.0-6.0	0.05-0.08	6.6-7.3	0-2	Low--------	0.05			
	13	---	---	---	---	---	---	-----------	-----			
168*:												
Taluce-----------	0-6	10-15	1.25-1.35	2.0-6.0	0.10-0.12	7.4-8.4	0-0	Low--------	0.20	2	3	.5-1
	6-17	10-15	1.30-1.40	2.0-6.0	0.10-0.12	7.9-8.4	0-2	Low--------	0.20			
	17	---	---	---	---	---	---	-----------	-----			
Taluce, thin solum-----------	0-6	10-15	1.25-1.35	2.0-6.0	0.10-0.12	7.4-8.4	0-0	Low--------	0.20	2	3	.5-1
	6	---	---	---	---	---	---	-----------	-----			
Rock outcrop-----	0-60	---	---	---	---	---	---	-----------	-----	---	8	---
169*:												
Taluce-----------	0-6	10-15	1.25-1.35	2.0-6.0	0.10-0.12	7.4-8.4	0-0	Low--------	0.20	2	3	.5-1
	6-17	10-15	1.30-1.40	2.0-6.0	0.10-0.12	7.9-8.4	0-2	Low--------	0.20			
	17	---	---	---	---	---	---	-----------	-----			
Taluce, thin solum-----------	0-3	10-15	1.25-1.35	2.0-6.0	0.10-0.12	7.4-8.4	0-0	Low--------	0.20	2	3	.5-1
	3-7	10-15	1.30-1.40	2.0-6.0	0.10-0.12	7.9-8.4	0-2	Low--------	0.20			
	7	---	---	---	---	---	---	-----------	-----			
Turnercrest------	0-6	5-12	1.25-1.35	2.0-6.0	0.12-0.14	7.4-8.4	0-0	Low--------	0.32	3	3	1-2
	6-28	7-18	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-0	Low--------	0.37			
	28	---	---	---	---	---	---	-----------	-----			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
170*:												
Tieside, north slopes----------	0-4	10-25	1.15-1.30	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.32	2	4L	.5-1
	4-12	15-25	1.25-1.40	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.32			
	12	---	---	---	---	---	---	-----------	----			
Rock outcrop----	0-60	---	---	---	---	---	---	-----------	----	---	8	---
171*:												
Treon------------	0-8	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-3
	8-16	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	16	---	---	---	---	---	---	-----------	----			
Aberone----------	0-7	5-15	1.25-1.35	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low--------	0.20	3	3	2-3
	7-16	5-18	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low--------	0.24			
	16-60	5-18	1.35-1.45	2.0-6.0	0.03-0.05	7.9-9.0	0-2	Low--------	0.05			
172*:												
Treon------------	0-8	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	8-16	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	16	---	---	---	---	---	---	-----------	----			
Aberone----------	0-7	5-15	1.25-1.35	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low--------	0.20	3	3	2-3
	7-16	5-18	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low--------	0.24			
	16-60	5-18	1.35-1.45	2.0-6.0	0.03-0.05	7.9-9.0	0-2	Low--------	0.05			
Treon, thin solum-----------	0-4	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	4-7	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	7	---	---	---	---	---	---	-----------	----			
173*:												
Treon, dry-------	0-7	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	7-13	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	13	---	---	---	---	---	---	-----------	----			
Aberone----------	0-4	5-15	1.25-1.35	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low--------	0.20	3	3	2-3
	4-14	5-18	1.35-1.45	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low--------	0.24			
	14-60	5-18	1.35-1.45	2.0-6.0	0.03-0.05	7.9-9.0	0-2	Low--------	0.05			
174*:												
Treon, thin solum-----------	0-6	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	6	---	---	---	---	---	---	-----------	----			
Rock outcrop----	0-60	---	---	---	---	---	---	-----------	----	---	8	---
Treon------------	0-8	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	8-16	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	16	---	---	---	---	---	---	-----------	----			
175*:												
Treon, dry-------	0-8	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	8-13	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	13	---	---	---	---	---	---	-----------	----			
Bayard-----------	0-12	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.28	5	3	1-3
	12-23	10-18	1.40-1.50	2.0-6.0	0.13-0.16	7.4-7.8	0-2	Low--------	0.32			
	23-60	10-18	1.40-1.50	2.0-6.0	0.10-0.13	7.4-8.4	0-2	Low--------	0.32			
176*:												
Trimad-----------	0-8	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.17	3	7	1-3
	8-13	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.17			
	13-37	10-20	1.25-1.30	2.0-6.0	0.07-0.10	7.9-8.4	0-2	Low--------	0.10			
	37-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low--------	0.10			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
176*:												
Blazon	0-4	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low	0.37	2	4L	.5-1
	4-14	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low	0.37			
	14	---	---	---	---	---	---	---	---			
177*:												
Trimad	0-7	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low	0.32	3	4L	1-3
	7-25	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low	0.17			
	25-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low	0.10			
Blazon, thin solum	0-4	18-27	1.05-1.15	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low	0.37	2	4L	.5-1
	4-8	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low	0.37			
	8	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	8	---
178*:												
Trimad	0-8	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low	0.17	3	7	1-3
	8-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low	0.10			
Evanston	0-8	15-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low	0.24	5	5	2-4
	8-23	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	23-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
179*:												
Trimad, dry	0-8	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low	0.32	3	4L	1-3
	8-13	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low	0.17			
	13-37	10-20	1.25-1.30	2.0-6.0	0.07-0.10	7.9-8.4	0-2	Low	0.10			
	37-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low	0.10			
Poposhia, dry	0-6	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low	0.37	5	4L	1-2
	6-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low	0.43			
180*:												
Trimad	0-8	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Low	0.32	3	4L	1-3
	8-14	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low	0.17			
	14-60	10-20	1.25-1.30	2.0-6.0	0.07-0.10	7.9-8.4	0-2	Low	0.10			
Weed	0-3	15-25	1.15-1.20	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low	0.24	5	5	1-2
	3-9	27-35	1.25-1.40	0.6-2.0	0.15-0.17	7.4-7.8	0-2	Moderate	0.28			
	9-27	27-35	1.25-1.40	0.2-0.6	0.15-0.19	7.4-8.4	0-2	Moderate	0.28			
	27-60	15-25	1.15-1.20	0.6-2.0	0.11-0.15	7.9-8.4	0-2	Low	0.24			
Blazon	0-2	18-27	1.05-1.15	0.6-2.0	0.15-0.17	7.9-8.4	0-2	Low	0.28	2	7	.5-1
	2-15	18-27	1.20-1.30	0.6-2.0	0.17-0.20	7.9-8.4	0-4	Low	0.37			
	15	---	---	---	---	---	---	---	---			
181*:												
Tyzak	0-7	18-27	1.10-1.20	0.6-2.0	0.12-0.14	7.4-8.4	0-2	Moderate	0.15	1	7	1-3
	7-15	18-27	1.20-1.40	0.6-2.0	0.05-0.08	7.9-8.4	0-2	Moderate	0.10			
	15	---	---	---	---	---	---	---	---			
Tyzak, thin solum	0-7	18-27	1.20-1.40	0.6-2.0	0.07-0.10	7.4-8.4	0-2	Moderate	0.10	1	8	1-3
	7	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	8	---
182*:												
Urban land.												

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
182*:												
Albinas---------	0-4	15-20	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.8	0-2	Low--------	0.24	5	5	3-6
	4-30	20-35	1.25-1.40	0.6-2.0	0.16-0.19	6.6-7.8	0-2	Moderate	0.24			
	30-60	10-20	1.25-1.40	0.6-2.0	0.16-0.18	7.4-8.4	0-2	Low--------	0.32			
183*:												
Urban land.												
Altvan----------	0-4	15-20	1.25-1.35	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.24	4	5	2-3
	4-20	18-35	1.25-1.40	0.6-2.0	0.14-0.16	7.4-8.4	0-2	Moderate	0.32			
	20-60	0-10	1.45-1.55	>20	0.03-0.04	7.9-8.4	0-2	Low--------	0.05			
184*:												
Urban land.												
Ascalon---------	0-8	18-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Moderate	0.28	5	5	1-2
	8-24	18-35	1.25-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.32			
	24-60	15-25	1.25-1.40	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32			
185*:												
Urban land.												
Bayard----------	0-10	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-2	Low--------	0.28	5	3	1-3
	10-29	10-18	1.40-1.50	2.0-6.0	0.13-0.16	7.4-7.8	0-2	Low--------	0.32			
	29-60	10-18	1.40-1.50	2.0-6.0	0.10-0.13	7.4-8.4	0-2	Low--------	0.32			
186*:												
Urban land.												
Evanston--------	0-3	15-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	0-0	Low--------	0.24	5	5	2-4
	3-15	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-7.8	0-2	Moderate	0.28			
	15-60	18-27	1.30-1.40	0.6-2.0	0.15-0.17	7.4-8.4	0-2	Moderate	0.28			
187*:												
Urban land.												
Merden----------	0-12	27-30	1.05-1.15	0.06-0.2	0.15-0.17	7.9-9.0	4-8	Moderate	0.32	5	7	1-3
	12-24	27-38	1.10-1.20	0.06-0.2	0.15-0.17	7.9-9.0	4-8	Moderate	0.37			
	24-60	27-30	1.20-1.30	0.06-0.2	0.15-0.17	7.9-9.0	4-8	Moderate	0.43			
188*:												
Urban land.												
Poposhia--------	0-6	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	6-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
189*:												
Urban land.												
Poposhia--------	0-6	18-25	1.05-1.15	0.6-2.0	0.19-0.21	7.4-8.4	0-2	Low--------	0.37	5	4L	1-2
	6-60	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	0-2	Low--------	0.43			
Trimad----------	0-3	10-20	1.10-1.20	0.6-2.0	0.16-0.18	7.9-8.4	0-2	Moderate	0.32	3	4L	1-3
	3-10	10-20	1.25-1.30	0.6-2.0	0.12-0.14	7.9-8.4	0-2	Low--------	0.17			
	10-34	10-20	1.25-1.30	2.0-6.0	0.07-0.10	7.9-8.4	0-2	Low--------	0.10			
	34-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-8.4	0-2	Low--------	0.10			
190:	0-10	3-10	1.50-1.60	6.0-20	0.08-0.11	6.6-7.8	0-2	Low--------	0.20	5	2	.5-1
Valent----------	10-60	3-10	1.50-1.60	6.0-20	0.08-0.11	6.6-7.8	0-2	Low--------	0.20			

See footnote at end of table.

Table 17.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
191*:												
Valent----------	0-8	3-10	1.50-1.60	6.0-20	0.08-0.11	6.6-7.8	0-2	Low--------	0.20	5	2	.5-1
	8-60	3-10	1.50-1.60	6.0-20	0.08-0.11	6.6-7.8	0-2	Low--------	0.20			
Treon-----------	0-7	10-20	1.30-1.40	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.20	2	3	2-4
	7-15	10-20	1.40-1.50	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	15	---	---	---	---	---	---	-----------	-----			
192-------------- Vetal	0-10	10-18	1.25-1.35	2.0-6.0	0.13-0.15	6.6-7.3	0-2	Low--------	0.20	5	3	1-3
	10-27	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	27-60	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
193-------------- Vetal	0-6	5-12	1.30-1.45	6.0-20	0.10-0.12	7.4-7.8	0-2	Low--------	0.17	5	2	1-3
	6-32	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
	32-60	10-18	1.25-1.35	2.0-6.0	0.13-0.15	7.4-8.4	0-2	Low--------	0.24			
194-------------- Vonalee	0-6	8-16	1.25-1.35	2.0-6.0	0.13-0.15	7.4-7.8	0-0	Low--------	0.24	5	3	1-2
	6-24	10-18	1.35-1.45	2.0-6.0	0.13-0.15	7.4-8.4	0-0	Low--------	0.24			
	24-60	6-14	1.35-1.45	2.0-6.0	0.11-0.13	7.9-8.4	0-0	Low--------	0.24			
195-------------- Wages	0-7	12-23	1.10-1.20	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.28	5	5	2-4
	7-13	27-33	1.20-1.30	0.2-0.6	0.19-0.21	7.4-7.8	0-2	Moderate	0.32			
	13-60	12-20	1.35-1.45	2.0-6.0	0.11-0.15	7.9-8.4	0-2	Low--------	0.28			
196-------------- Weed	0-6	15-25	1.15-1.20	0.6-2.0	0.16-0.18	7.4-7.8	0-2	Low--------	0.24	5	5	1-2
	6-14	27-35	1.25-1.40	0.6-2.0	0.15-0.17	7.4-7.8	0-2	Moderate	0.28			
	14-28	27-35	1.25-1.40	0.2-0.6	0.15-0.19	7.4-8.4	0-2	Moderate	0.28			
	28-60	20-30	1.25-1.40	0.6-2.0	0.14-0.16	7.9-8.4	0-2	Moderate	0.28			

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 18.--Soil and Water Features

("Flooding," "water table," and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
100------------- Albinas	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
101------------- Altvan	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
102*:												
Altvan----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Dix-------------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
103, 104---------- Ascalon	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
105------------- Bayard	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
106------------- Bayard, wet	C	Occasional	Brief-----	Apr-May	3.0-5.0	Apparent	Apr-Jul	>60	---	Low------	High-----	Low.
107*:												
Bayard----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Paoli-----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
108*:												
Blazon----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
Blazon, thin solum----------	D	None--------	---	---	>6.0	---	---	4-10	Soft	Low------	High-----	Low.
Poposhia--------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
109*:												
Blazon----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
Chaperton-------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High-----	Low.
110*:												
Blazon----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
Chaperton-------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High-----	Low.
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Soft	---	---	---
111*:												
Blazon----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
Trimad----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
112*:												
Boyle-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Alderon---------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Low.
Cathedral--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.

See footnote at end ot table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro- logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
113*:												
Boyle------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Boyle, thin solum	D	None--------	---	---	>6.0	---	---	4-10	Soft	Moderate	Moderate	Low.
114*:												
Boyle, thin solum	D	None--------	---	---	>6.0	---	---	4-10	Soft	Moderate	Moderate	Low.
Breece-----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Cathedral--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
115*:												
Boyle, very stony	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Boyle, thin solum	D	None--------	---	---	>6.0	---	---	4-10	Soft	Moderate	Moderate	Low.
Lininger---------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
116*:												
Boyle------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Lininger---------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
Boyle, thin solum	D	None--------	---	---	>6.0	---	---	4-10	Soft	Moderate	Moderate	Low.
117*:												
Boyle------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Hard	---	---	---
Cathedral--------	D	None--------	---	---	>60	---	---	10-20	Hard	Moderate	Moderate	Low.
118*:												
Boyle------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
Lininger---------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
119--------------- Breece	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
120--------------- Bresser	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
121--------------- Cantle	D	Occasional	Long------	Apr-May	0.5-1.5	Apparent	Apr-Jun	>60	---	High-----	High-----	Low.
122*:												
Cantle-----------	D	Occasional	Long------	Apr-May	0.5-1.5	Apparent	Apr-Jul	>60	---	High-----	High-----	Low.
Merden, saline---	D	Frequent----	Long------	Apr-May	0.5-1.5	Apparent	Apr-Jul	>60	---	High-----	High-----	High.
123*:												
Cathedral--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
Boyle------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Low.
124*:												
Chalkcreek Family	C	Rare--------	---	---	3.0-4.0	Apparent	Apr-Aug	>60	---	Moderate	High-----	Low.
125*:												
Chalkcreek-------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.

See footnote at end of table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
125*:												
Tieside	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
126 Chivington	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
127 Cowestglen	B	Occasional	Very brief	Apr-May	>6.0	---	---	>60	---	Moderate	High	Low.
128*:												
Dalecreek	C	Rare	---	---	3.0-4.0	Apparent	Apr-Jul	>60	---	Moderate	High	Low.
Kovich, cool	D	Rare	---	---	0.5-1.5	Apparent	Apr-Jul	>60	---	High	High	Low.
129*:												
Dix	A	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Altvan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
130 Embry	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
131 Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
132*:												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Weed	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
133*:												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Weed	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Trimad	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
134*:												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Ipson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
135*:												
Haverdad	B	Occasional	Very brief	Apr-Jun	>6.0	---	---	>60	---	Low	High	Low.
Clarkelen	B	Occasional	Very brief	Apr-Jun	2.0-5.0	Apparent	Apr-Jul	>60	---	Low	High	Low.
Kovich, warm	D	Occasional	Very brief	Apr-Jun	0.5-1.5	Apparent	Apr-Jul	>60	---	High	High	Low.
136 Haverson	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
137*:												
Ipson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Breece, dry	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
138*:												
Ipson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.

See footnote at end of table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
138*:												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
139*:												
Ipson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Hard	---	---	---
140*:												
Ipson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Pinelli	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Hard	---	---	---
141*:												
Ipson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Trimad	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
142, 143 Manter	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
144*:												
Manter	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Treon	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
145 Merden	D	Frequent	Long	Apr-May	0.5-2.0	Apparent	Apr-Nov	>60	---	High	High	Low.
146*:												
Merden, cool	D	Frequent	Long	Apr-May	0.5-1.5	Apparent	Apr-Jul	>60	---	High	High	High.
Kovich	D	Rare	---	---	0.5-1.5	Apparent	Apr-Jul	>60	---	High	High	Low.
147 Mitchell	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
148 Moskee	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
149 Nucla	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
150 Otero	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
151*:												
Otero	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Valent	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Tassel	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
152, 153 Paoli	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
154 Peetz	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.

See footnote at end of table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
155*:												
Peetz	D	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Altvan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
156 Pinelli	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
157*:												
Pinelli	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Chivington	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
158 Poposhia	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
159*:												
Poposhia	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Blazon	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
160*:												
Poposhia	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Blazon, thin solum	D	None	---	---	>6.0	---	---	4-10	Soft	Low	High	Low.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Soft	---	---	---
161*:												
Poposhia	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Piezon	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
162*:												
Poposhia	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Trimad	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
163*:												
Redthayne	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Tyzak, thin solum	D	None	---	---	>6.0	---	---	4-10	Hard	Low	High	Low.
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
164*:												
Redthayne	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Tyzak	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Hard	---	---	---
165* Riverwash	D	Frequent	Long or very long	Oct-Jul	0-2.0	Apparent	Jan-Dec	>60	---	---	---	---
166*:												
Rock outcrop	D	None	---	---	>6.0	---	---	0	Soft	---	---	---
Blazon, thin solum	D	None	---	---	>6.0	---	---	4-10	Soft	Low	High	Low.

See footnote at end of table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
167*:												
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Hard	---	---	---
Cathedral--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
168*:												
Taluce-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low-------	High-----	Low.
Taluce, thin solum-----------	D	None--------	---	---	>6.0	---	---	4-10	Soft	Low-------	High-----	Low.
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Soft	---	---	---
169*:												
Taluce-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low-------	High-----	Low.
Taluce, thin solum-----------	D	None--------	---	---	>6.0	---	---	4-10	Soft	Low-------	High-----	Low.
Turnercrest------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low-------	High-----	Low.
170*:												
Tieside, north slopes----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High-----	Low.
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Hard	---	---	---
171*:												
Treon------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High-----	Low.
Aberone----------	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Low.
172*:												
Treon------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High-----	Low.
Aberone----------	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Low.
Treon, thin solum	D	None--------	---	---	>6.0	---	---	4-10	Soft	Moderate	High-----	Low.
173*:												
Treon, dry-------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High-----	Low.
Aberone----------	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Low.
174*:												
Treon, thin solum	D	None--------	---	---	>6.0	---	---	4-10	Soft	Moderate	High-----	Low.
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Soft	---	---	---
Treon------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High-----	Low.
175*:												
Treon, dry-------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High-----	Low.
Bayard-----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
176*:												
Trimad-----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Blazon-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low-------	High-----	Low.

See footnote at end of table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
177*:												
Trimad	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Blazon, thin solum	D	None	---	---	>6.0	---	---	4-10	Soft	Low	High	Low.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Soft	---	---	---
178*:												
Trimad	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
179*:												
Trimad, dry	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Poposhia, dry	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
180*:												
Trimad	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Weed	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Blazon	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
181*:												
Tyzak	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Tyzak, thin solum	D	None	---	---	>6.0	---	---	4-10	Hard	Low	High	Low.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Hard	---	---	---
182*:												
Urban land.												
Albinas	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
183*:												
Urban land.												
Altvan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
184*:												
Urban land.												
Ascalon	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
185*:												
Urban land.												
Bayard	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
186*:												
Urban land.												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
187*:												
Urban land.												
Merden	D	Frequent	Long	Apr-May	0.5-2.0	Apparent	Apr-Nov	>60	---	High	High	Low.

See footnote at end of table.

Table 18.--Soil and Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
188*:												
Urban land.												
Poposhia----------	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
189*:												
Urban land.												
Poposhia----------	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Trimad------------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
190---------------- Valent	A	None--------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Low.
191*:												
Valent------------	A	None--------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Low.
Treon-------------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High------	Low.
192, 193----------- Vetal	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
194---------------- Vonalee	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
195---------------- Wages	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
196---------------- Weed	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 19.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Aberone	Loamy-skeletal, carbonatic, mesic Aridic Haplustolls
Albinas	Fine-loamy, mixed, mesic Pachic Argiustolls
Alderon	Fine-loamy, mixed Typic Eutroboralfs
Altvan	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argiustolls
Ascalon	Fine-loamy, mixed, mesic Aridic Argiustolls
Bayard	Coarse-loamy, mixed, mesic Torriorthentic Haplustolls
*Bayard, wet	Coarse-loamy, mixed, mesic Oxyaquic Haplustolls
Blazon	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Boyle	Loamy-skeletal, mixed, shallow Aridic Argiborolls
Breece	Coarse-loamy, mixed Pachic Haploborolls
*Bresser	Fine-loamy, mixed, mesic Aridic Argiustolls
Cantle	Fine-loamy, mixed (calcareous), frigid Cumulic Endoaquolls
Cathedral	Loamy-skeletal, mixed Lithic Haploborolls
Chalkcreek	Fine-silty, mixed Borollic Camborthids
Chalkcreek Family	Fine-silty, mixed Borollic Camborthids
Chaperton	Fine-loamy, mixed Borollic Camborthids
Chivington	Fine, mixed Pachic Argiborolls
*Clarkelen	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Cowestglen	Coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Dalecreek	Fine-loamy, mixed Cumulic Haploborolls
Dix	Sandy-skeletal, mixed, mesic Torriorthentic Haplustolls
Embry	Coarse-loamy, mixed, nonacid, mesic Ustic Torriorthents
Evanston	Fine-loamy, mixed Aridic Argiborolls
*Haverdad	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Haverson	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Ipson	Loamy-skeletal, mixed Aridic Argiborolls
Kovich	Fine-loamy, mixed, frigid Cumulic Endoaquolls
Kovich, cool	Fine-loamy, mixed, frigid Cumulic Endoaquolls
*Kovich, warm	Fine-loamy, mixed, mesic Cumulic Endoaquolls
Lininger	Fine-loamy, mixed Typic Argiborolls
Manter	Coarse-loamy, mixed, mesic Aridic Argiustolls
Merden	Fine-loamy, mixed (calcareous), mesic Fluvaquentic Endoaquolls
*Merden, cool	Fine-silty, mixed (calcareous), frigid Fluvaquentic Endoaquolls
*Merden, saline	Fine-silty, mixed (calcareous), frigid Fluvaquentic Endoaquolls
Mitchell	Coarse-silty, mixed (calcareous), mesic Ustic Torriorthents
Moskee	Fine-loamy, mixed, mesic Aridic Argiustolls
Nucla	Fine-loamy, mixed, mesic Torriorthentic Haplustolls
Otero	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Paoli	Coarse-loamy, mixed, mesic Pachic Haplustolls
Peetz	Sandy-skeletal, mixed, mesic Aridic Calciustolls
Piezon	Fine-loamy, mixed Borollic Calciorthids
Pinelli	Fine, montmorillonitic Borollic Haplargids
Poposhia	Fine-loamy, mixed (calcareous), frigid Ustic Torriorthents
Redthayne	Loamy-skeletal, mixed Aridic Haploborolls
Taluce	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Tassel	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Tieside	Loamy, mixed, shallow Borollic Calciorthids
Treon	Loamy, mixed, mesic, shallow Torriorthentic Haplustolls
*Trimad	Loamy-skeletal, mixed Typic Calciborolls
*Trimad, dry	Loamy-skeletal, mixed Typic Calciborolls
Turnercrest	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Tyzak	Loamy-skeletal, mixed Lithic Calciborolls
*Tyzak, thin solum	Loamy-skeletal, mixed Lithic Haploborolls
Valent	Mixed, mesic Ustic Torripsamments
Vetal	Coarse-loamy, mixed, mesic Pachic Haplustolls
Vonalee	Coarse-loamy, mixed, mesic Ustic Haplargids
Wages	Fine-loamy, mixed, mesic Aridic Argiustolls
Weed	Fine-loamy, mixed Pachic Argiborolls

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

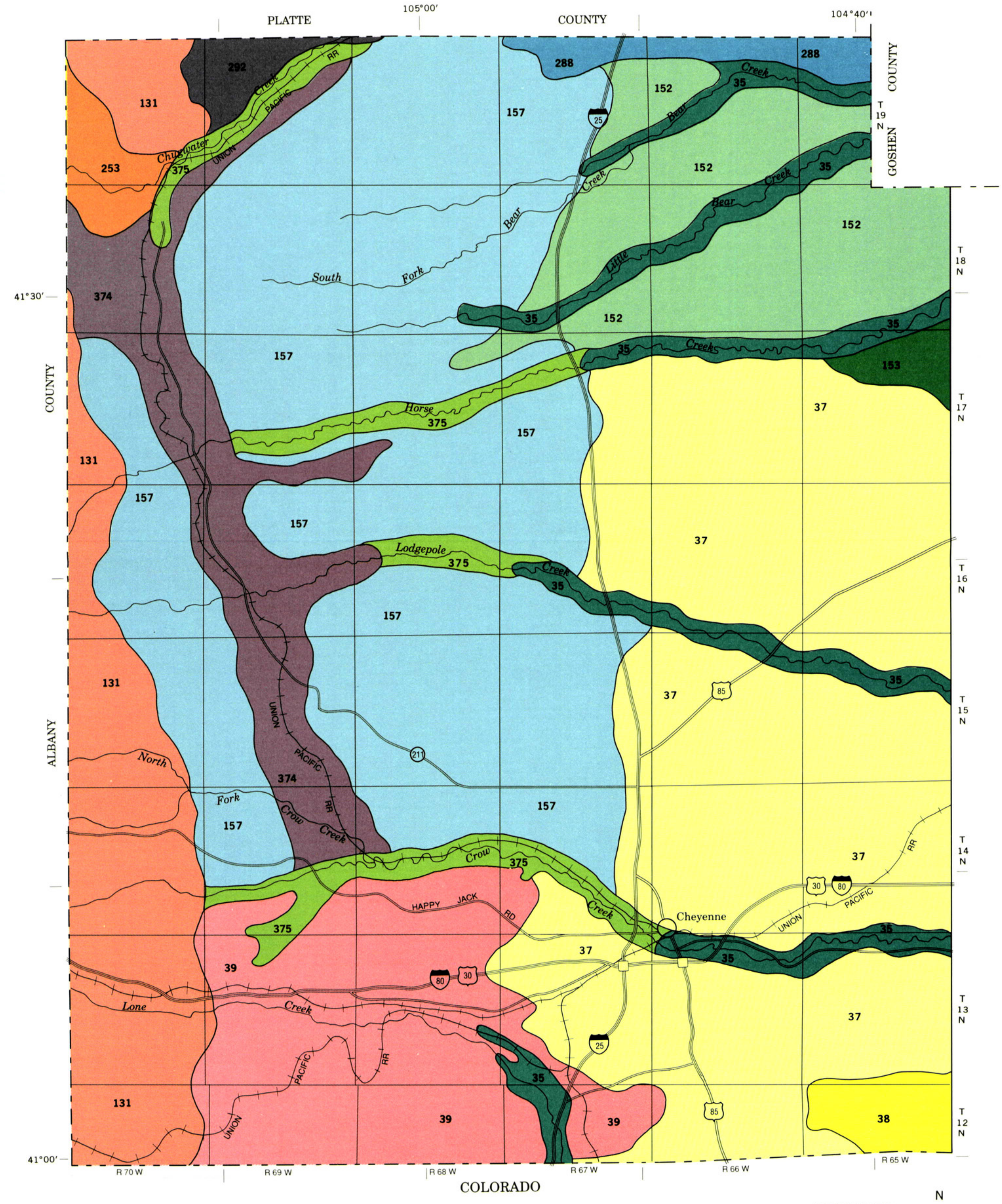
Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

SOIL LEGEND*

SOILS OF THE FLOOD PLAINS AND ADJACENT UPLANDS

- 35 Merden-Ascalon-Altvan
- 375 Merden-Evanston-Chivington

SOILS OF THE PLAINS

- 37 Ascalon-Altvan-Treon
- 38 Treon-Dix-Aberone
- 152 Manter-Treon-Aberone
- 153 Vetal-Treon-Bayard
- 288 Taluce-Embry-Manter

SOILS OF THE FOOTHILLS

- 39 Evanston-Trinidad-Poposhia
- 157 Ipson-Evanston-Trimad
- 292 Ipson-Evanston-Tyzak
- 374 Poposhia-Blazon-Trimad

SOILS OF THE MOUNTAINS

- 131 Boyle-Lininger-Rock Outcrop
- 253 Tyzak-Redthayne-Rock Outcrop

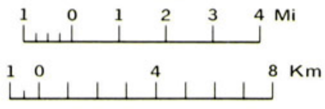
* The units on this legend are describedin the text under the heading "General Soil Map Units."

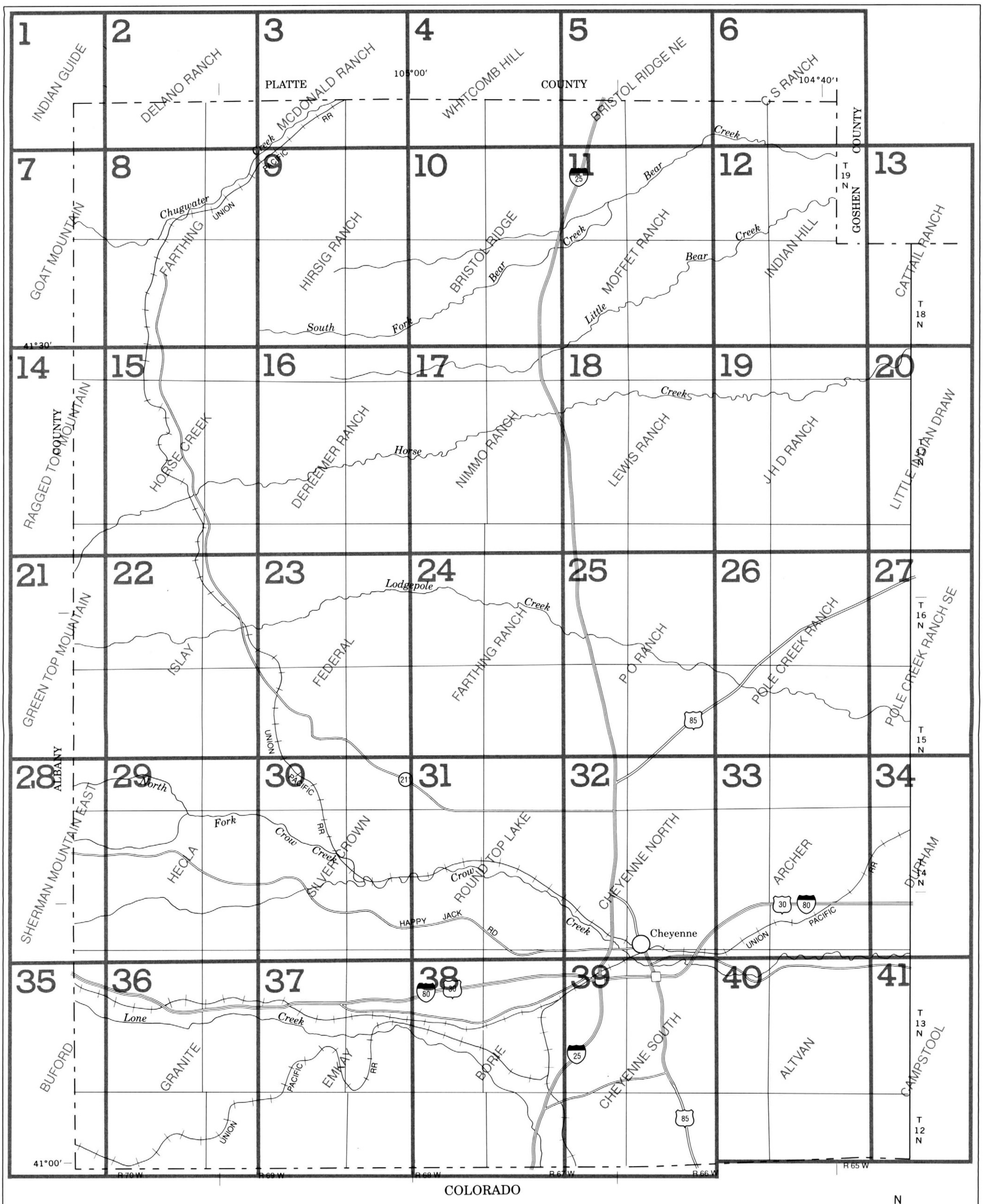
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
UNIVERSITY OF WYOMING AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

LARAMIE COUNTY, WYOMING WESTERN PART

Scale 1:253,440





SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

LARAMIE COUNTY, WYOMING WESTERN PART

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km

SOIL LEGEND

SYMBOL	NAME
100	Albinas loam, 0 to 6 percent slopes
101	Altvan loam, 0 to 6 percent slopes
102	Altvan-Dix complex, 6 to 10 percent slopes
103	Ascalon fine sandy loam, 6 to 9 percent slopes
104	Ascalon loam, 0 to 6 percent slopes
105	Bayard fine sandy loam, 0 to 15 percent slopes
106	Bayard fine sandy loam, wet, 0 to 3 percent slopes
107	Bayard-Paoli fine sandy loams, 0 to 10 percent slopes
108	Blazon-Blazon, thin solum-Poposhia silt loams, 0 to 6 percent slopes
109	Blazon-Chaperton complex, 3 to 20 percent slopes
110	Blazon-Chaperton-Rock outcrop complex, 10 to 45 percent slopes
111	Blazon-Trimad complex, 15 to 45 percent slopes
112	Boyle-Alderon-Cathedral complex, 5 to 45 percent slopes
113	Boyle-Boyle, thin solum, gravelly loams, 3 to 6 percent slopes
114	Boyle, thin solum-Breece-Cathedral complex, 0 to 30 percent slopes
115	Boyle, very stony-Boyle, thin solum-Lininger complex, 20 to 45 percent slopes
116	Boyle-Lininger-Boyle, thin solum, complex, 3 to 45 percent slopes
117	Boyle-Rock outcrop-Cathedral complex, 5 to 45 percent slopes
118	Boyle-Lininger association, 1 to 15 percent slopes
119	Breece fine sandy loam, 0 to 10 percent slopes
120	Bresser sandy loam, 0 to 3 percent slopes
121	Cantle loam, 0 to 3 percent slopes
122	Cantle-Merden, saline, complex, 0 to 3 percent slopes
123	Cathedral-Boyle complex, 10 to 30 percent slopes
124	Chalkcreek Family, 0 to 3 percent slopes
125	Chalkcreek-Tieside loams, 0 to 6 percent slopes
126	Chivington loam, 0 to 6 percent slopes
127	Cowestglen fine sandy loam, 0 to 3 percent slopes
128	Dalecreek-Kovich, cool, loams, 0 to 9 percent slopes
129	Dix-Altvan complex, 10 to 30 percent slopes
130	Embry loamy fine sand, 2 to 10 percent slopes
131	Evanston loam, 0 to 6 percent slopes
132	Evanston-Weed complex, 3 to 35 percent slopes
133	Evanston-Weed-Trimad loams, 3 to 15 percent slopes
134	Evanston-Ipson association, 3 to 20 percent slopes
135	Haverdad-Clarkelen-Kovich, warm, complex, 0 to 3 percent slopes
136	Haverson loam, 0 to 3 percent slopes
137	Ipson-Breece, dry-Evanston complex, 0 to 6 percent slopes
138	Ipson-Evanston complex, 6 to 30 percent slopes
139	Ipson-Evanston-Rock outcrop complex, 0 to 30 percent slopes
140	Ipson-Pinelli-Rock outcrop complex, 6 to 45 percent slopes
141	Ipson-Trimad complex, 15 to 45 percent slopes
142	Manter sandy loam, 0 to 6 percent slopes
143	Manter fine sandy loam, 6 to 30 percent slopes
144	Manter-Treon fine sandy loams, 0 to 15 percent slopes
145	Merden silty clay loam, 0 to 3 percent slopes
146	Merden, cool-Kovich complex, 0 to 3 percent slopes
147	Mitchell silt loam, 0 to 6 percent slopes
148	Moskee fine sandy loam, 0 to 3 percent slopes
149	Nucla loam, 0 to 3 percent slopes
150	Otero fine sandy loam, 0 to 6 percent slopes
151	Otero-Valent-Tassel complex, 0 to 15 percent slopes
152	Paoli fine sandy loam, 0 to 3 percent slopes
153	Paoli fine sandy loam, 6 to 9 percent slopes
154	Peetz gravelly sandy loam, 5 to 20 percent slopes
155	Peetz-Altvan complex, 0 to 20 percent slopes
156	Pinelli loam, 3 to 10 percent slopes
157	Pinelli-Chivington complex, 0 to 15 percent slopes
158	Poposhia silt loam, 0 to 6 percent slopes
159	Poposhia-Blazon silt loams, 3 to 30 percent slopes
160	Poposhia-Blazon, thin solum-Rock outcrop complex, 5 to 35 percent slopes
161	Poposhia-Piezon silt loams, 0 to 6 percent slopes
162	Poposhia-Trimad complex, 3 to 15 percent slopes
163	Redthayne-Tyzak, thin solum-Evanston complex, 0 to 15 percent slopes
164	Redthayne-Tyzak-Rock outcrop complex, 15 to 45 percent slopes
165	Riverwash
166	Rock outcrop-Blazon, thin solum, complex, 30 to 60 percent slopes
167	Rock outcrop-Cathedral complex, 20 to 40 percent slopes
168	Taluce-Taluce, thin solum-Rock outcrop complex, 3 to 30 percent slopes
169	Taluce-Taluce, thin solum-Turnercrest fine sandy loams, 3 to 15 percent slopes
170	Tieside, north slopes-Rock outcrop complex, 10 to 45 percent slopes
171	Treon-Aberone fine sandy loams, 6 to 30 percent slopes
172	Treon-Aberone-Treon, thin solum, fine sandy loams, 3 to 30 percent slopes
173	Treon, dry-Aberone fine sandy loams, 10 to 30 percent slopes
174	Treon, thin solum-Rock outcrop-Treon complex, 6 to 30 percent slopes
175	Treon, dry-Bayard association, 3 to 30 percent slopes
176	Trimad-Blazon complex, 15 to 45 percent slopes
177	Trimad-Blazon, thin solum-Rock outcrop complex, 20 to 45 percent slopes
178	Trimad-Evanston complex, 3 to 30 percent slopes
179	Trimad-Poposhia complex, dry, 6 to 15 percent slopes
180	Trimad-Weed-Blazon association, 0 to 15 percent slopes
181	Tyzak-Tyzak, thin solum-Rock outcrop complex, 30 to 50 percent slopes
182	Urban land-Albinas complex, 0 to 6 percent slopes
183	Urban land-Altvan complex, 0 to 6 percent slopes
184	Urban land-Ascalon complex, 0 to 6 percent slopes
185	Urban land-Bayard complex, 0 to 15 percent slopes
186	Urban land-Evanston complex, 0 to 6 percent slopes
187	Urban land-Merden complex, 0 to 3 percent slopes
188	Urban land-Poposhia complex, 0 to 6 percent slopes
189	Urban land-Poposhia-Trimad complex, 3 to 15 percent slopes
190	Valent loamy fine sand, moist, 0 to 6 percent slopes
191	Valent-Treon complex, 6 to 30 percent slopes
192	Vetal fine sandy loam, 0 to 6 percent slopes
193	Vetal loamy fine sand, 0 to 6 percent slopes
194	Vonalee fine sandy loam, 0 to 6 percent slopes
195	Wages loam, 0 to 6 percent slopes
196	Weed loam, 0 to 6 percent slopes
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Limit of soil survey (label)
- Field sheet matchline and neatline

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

TRANSPORTATION — (Labels only)

ROAD EMBLEM & DESIGNATIONS

Interstate	173
Federal	287
State	52
County, farm or ranch	1283

RAILROAD — (Labels only)

DAMS

- Medium or Small
(Named where applicable) — Water

PITS

- Gravel pit

MISCELLANEOUS CULTURAL FEATURES

- Windmill

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation ditch

LAKES, PONDS AND RESERVOIRS

- Perennial water

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 113 123

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 1 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
INDIAN GUIDE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

(Joins sheet 4, Whitcomb Hill)

(Joins sheet 17, Nimmo Ranch)

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

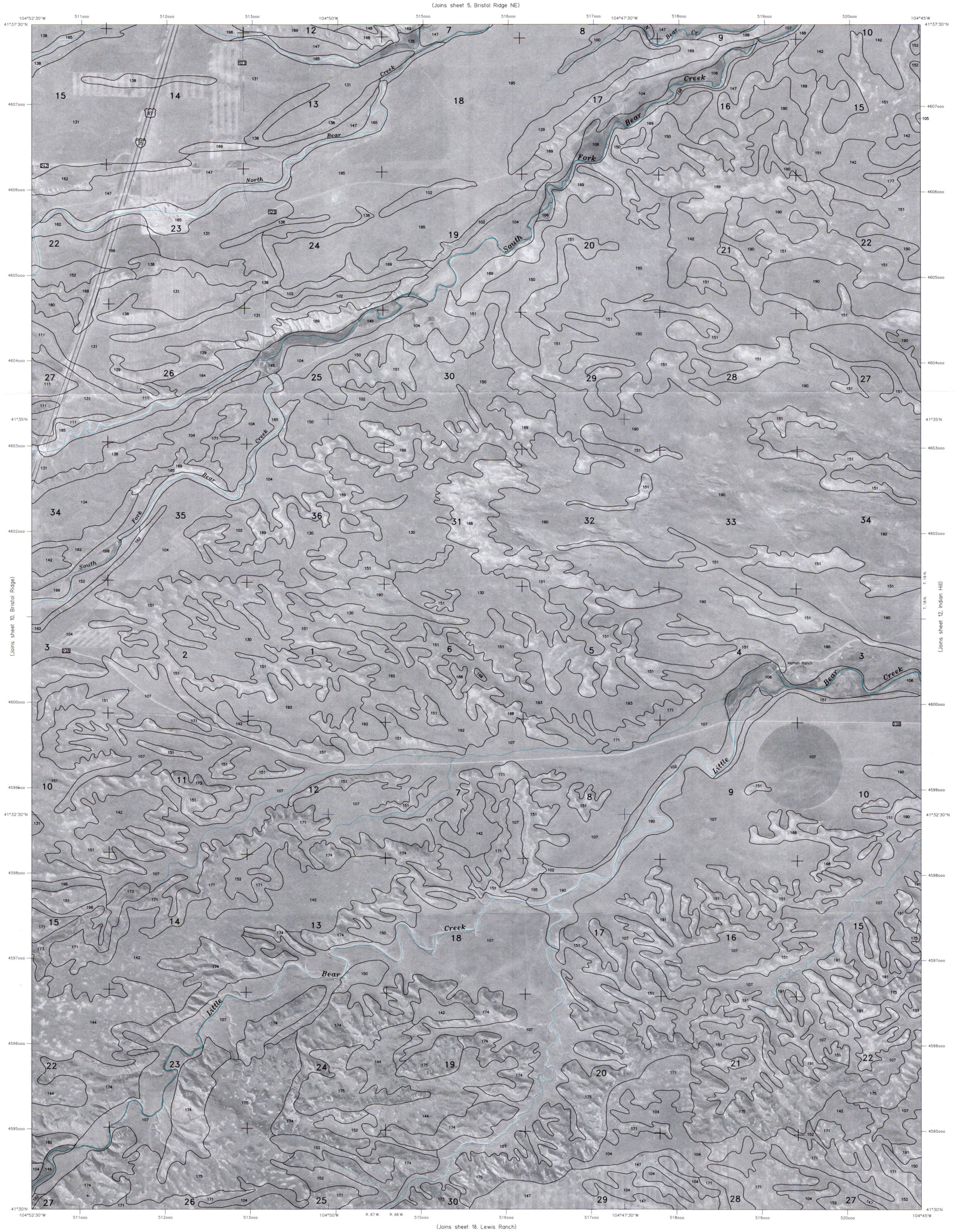
Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 10 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
BRISTOL RIDGE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING

MOFFETT RANCH QUADRANGLE
SHEET NUMBER 11
7.5 MINUTE SERIES



Scale 1:24000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 11 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
MOFFETT RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

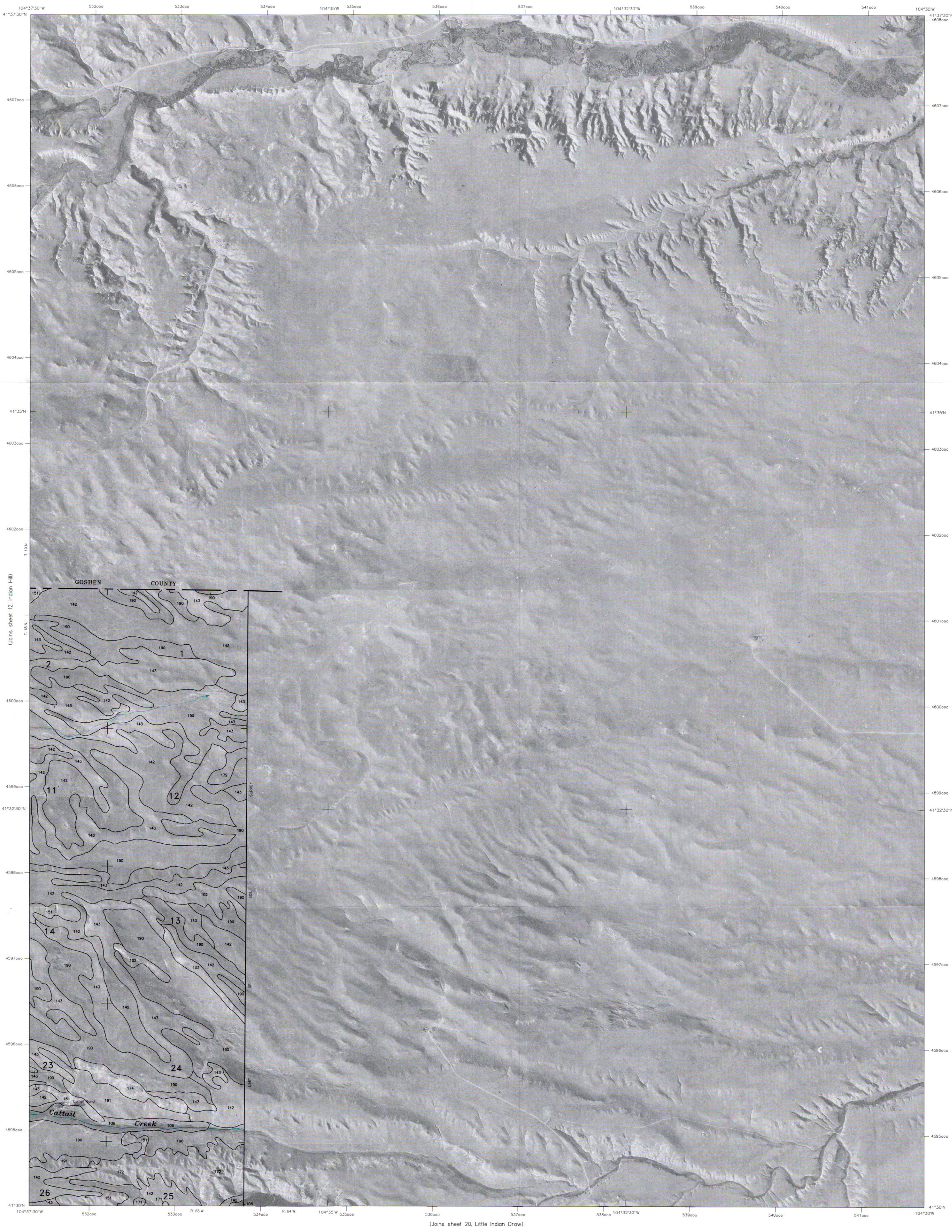
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER
Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 12 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
INDIAN HILL QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 13 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
CATTAIL RANCH QUADRANGLE

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 14 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
RAGGED TOP MOUNTAIN QUADRANGLE

(Joins sheet 8, Farthing)

(Joins sheet 14, Ragged Top Mountain)

(Joins sheet 16, Dereemer Ranch)

(Joins sheet 22, Islay)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 15 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
HORSE CREEK QUADRANGLE

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 16 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
DEREEMER RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
NIMMO RANCH QUADRANGLE
SHEET NUMBER 17
7.5 MINUTE SERIES

(Joins sheet 10, Bristol Ridge)

(Joins sheet 24, Farthing Ranch)

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 17 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
NIMMO RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

SHEET NUMBER 18 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
LEWIS RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

(Joins sheet 12, Indian Hill)

(Joins sheet 26, Pole Creek Ranch)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 19 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
J H D RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 2 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
DELANO RANCH QUADRANGLE

Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 20 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
LITTLE INDIAN DRAW QUADRANGLE

N

Scale 1:24000

1 MILE
7000 FEET
1 KILOMETER

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 21 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
GREEN TOP MOUNTAIN QUADRANGLE

(Joins sheet 15, Horse Creek)

(Joins sheet 29, Hecla)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 22 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
ISLAY QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
FEDERAL QUADRANGLE
SHEET NUMBER 23
7.5 MINUTE SERIES

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 23 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
FEDERAL QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 24 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
FARTHING RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
P O RANCH QUADRANGLE
SHEET NUMBER 25
7.5 MINUTE SERIES

(Joins sheet 18, Lewis Ranch)

(Joins sheet 24, Farthing Ranch)

(Joins sheet 26, Pole Creek Ranch)

(Joins sheet 32, Cheyenne North)

Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 25 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
P O RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

(Joins sheet 19, J H D Ranch)

(Joins sheet 25, P O Ranch)

(Joins sheet 27, Pole Creek Ranch SE)

(Joins sheet 33, Archer)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

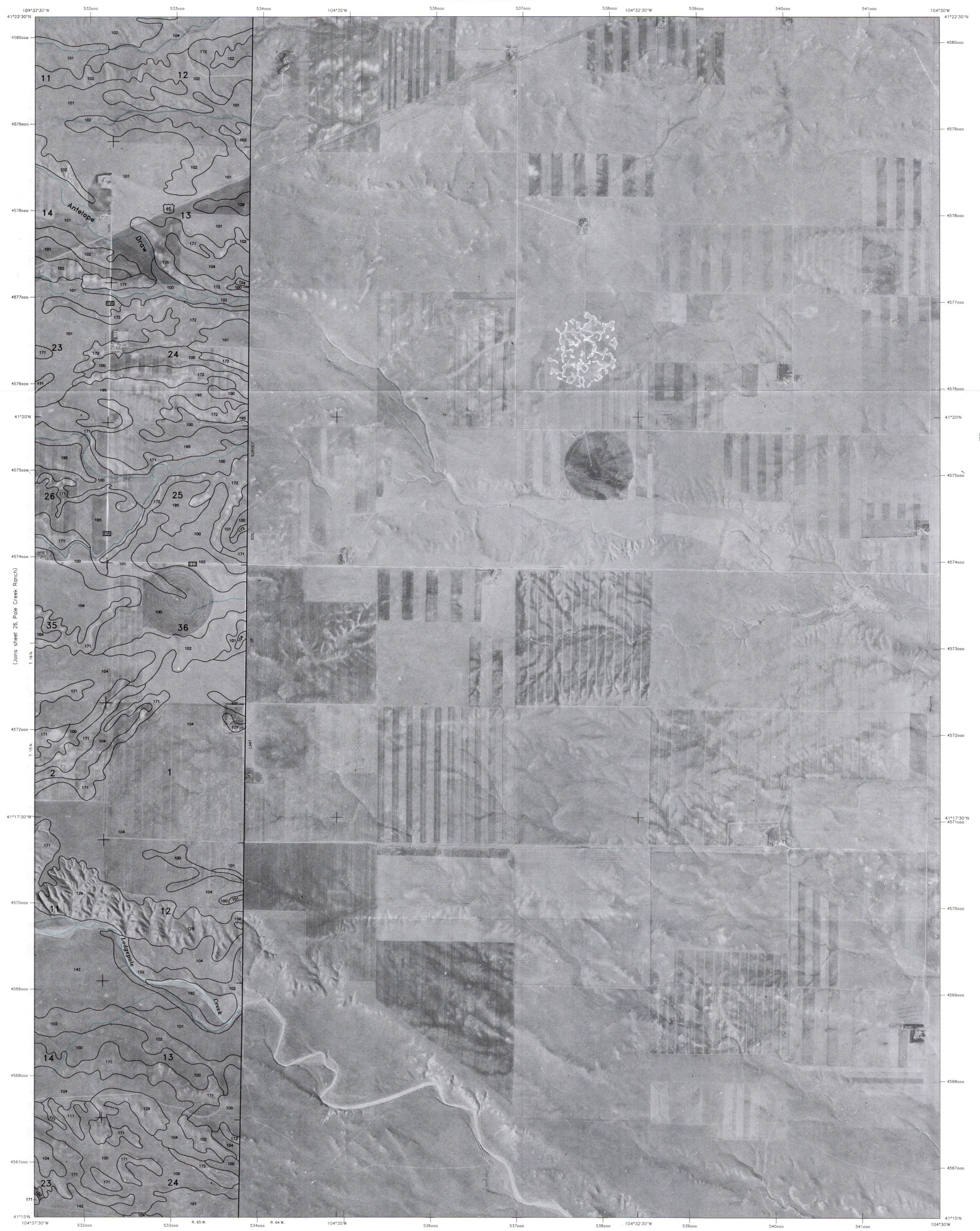
N

SHEET NUMBER 26 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
POLE CREEK RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
POLE CREEK RANCH SE QUADRANGLE
SHEET NUMBER 27
7.5 MINUTE SERIES

(Joins sheet 20, Little Indian Draw)



(Joins sheet 34, Durham)

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

SHEET NUMBER 27 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
POLE CREEK RANCH SE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
SHERMAN MOUNTAINS EAST QUADRANGLE
SHEET NUMBER 28
7.5 MINUTE SERIES

Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 28 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
SHERMAN MOUNTAINS EAST QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 MILE
7000 FEET
1 KILOMETER
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 29 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
HECLA QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 3 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
MCDONALD RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 30 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
SILVER CROWN QUADRANGLE

(Joins sheet 24, Farthing Ranch)

(Joins sheet 30, Silver Crown)

(Joins sheet 32, Cheyenne North)

(Joins sheet 38, Borie)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 31 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
ROUND TOP LAKE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
CHEYENNE NORTH QUADRANGLE
SHEET NUMBER 32
7.5 MINUTE SERIES

(Joins sheet 25, P O Ranch)

(Joins sheet 39, Cheyenne South)

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 32 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
CHEYENNE NORTH QUADRANGLE

(Joins sheet 26, Pole Creek Ranch)

(Joins sheet 40, Altvan)

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 33 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
ARCHER QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
DURHAM QUADRANGLE
SHEET NUMBER 34
7.5 MINUTE SERIES

Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 34 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
DURHAM QUADRANGLE

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 35 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
BUFORD QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

(Joins sheet 29, Hecla)

(Joins sheet 35, Buford)

(Joins sheet 37, Emkay)

Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 36 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
GRANITE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

LARAMIE COUNTY, WESTERN PART, WYOMING
EMKAY QUADRANGLE
SHEET NUMBER 37
8.0 MINUTE SERIES

(Joins sheet 30, Silver Crown)

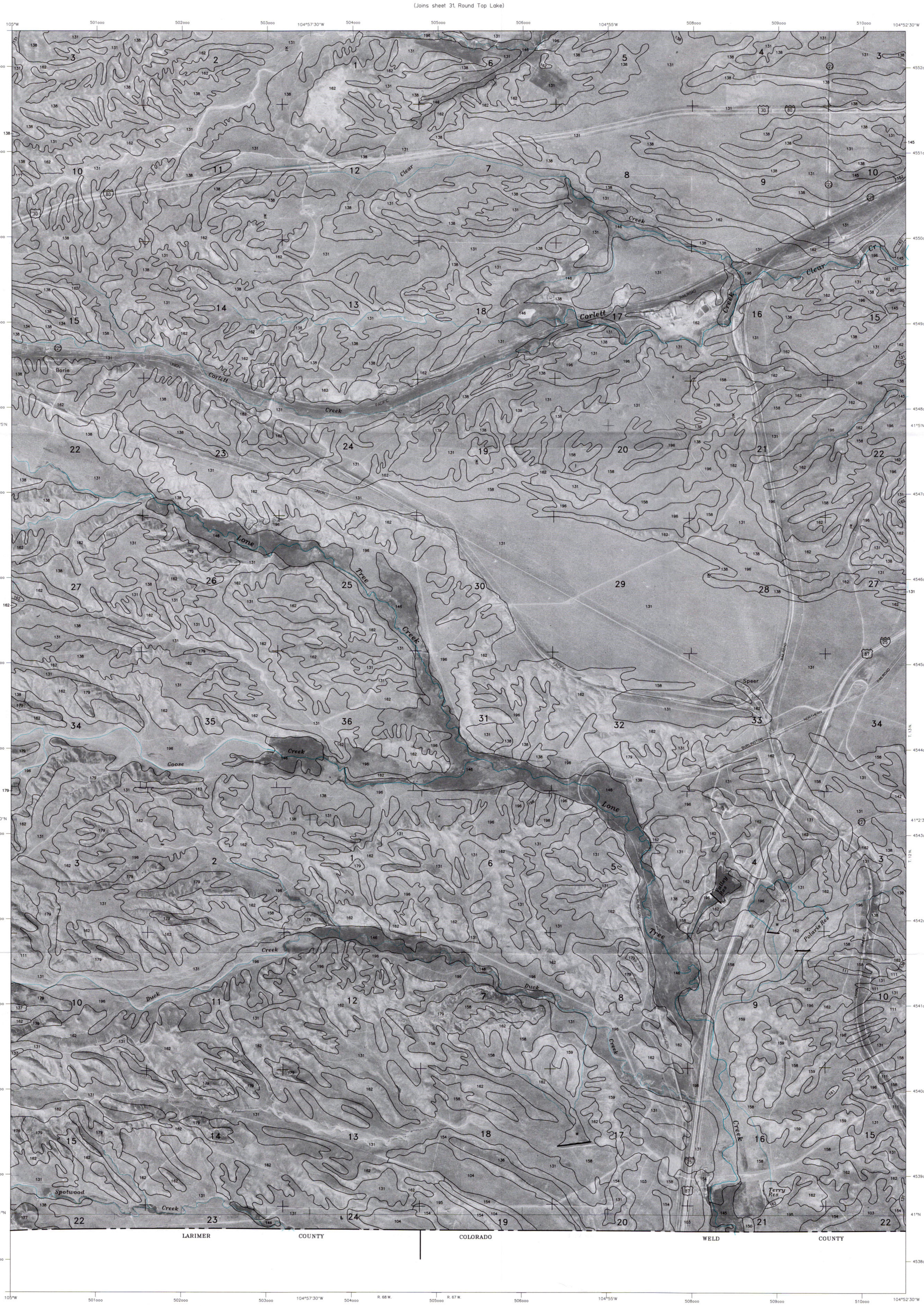
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 37 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
EMKAY QUADRANGLE



1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 38 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
BORIE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

(Joins sheet 32, Cheyenne North)

1 MILE
7000 FEET
1 KILOMETER

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

LARAMIE COUNTY, WESTERN PART, WYOMING NO. 39
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 4 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
WHITCOMB HILL QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

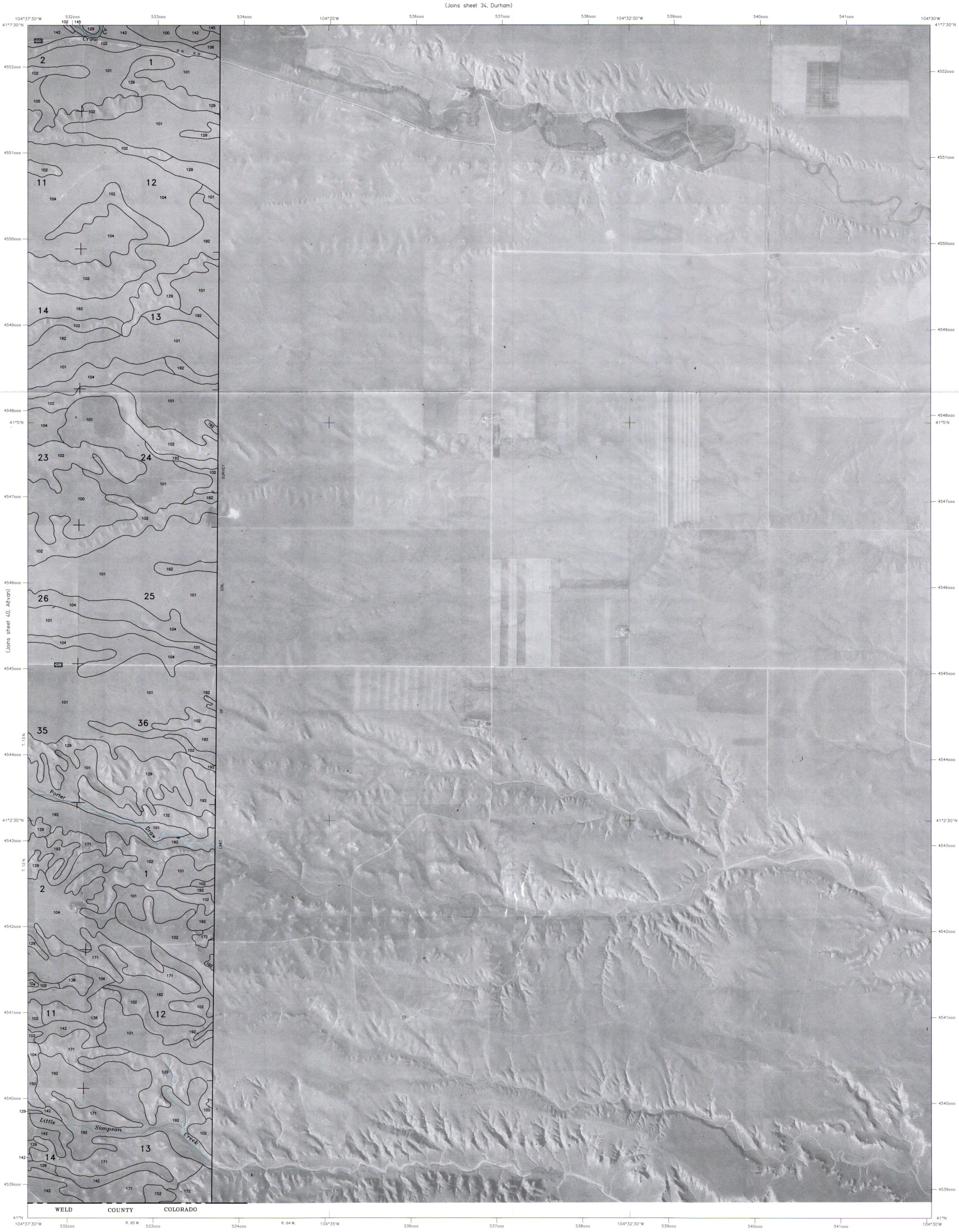
This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER
Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 40 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
ALTVAN QUADRANGLE



This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

N

SHEET NUMBER 41 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
CAMPSTOOL QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

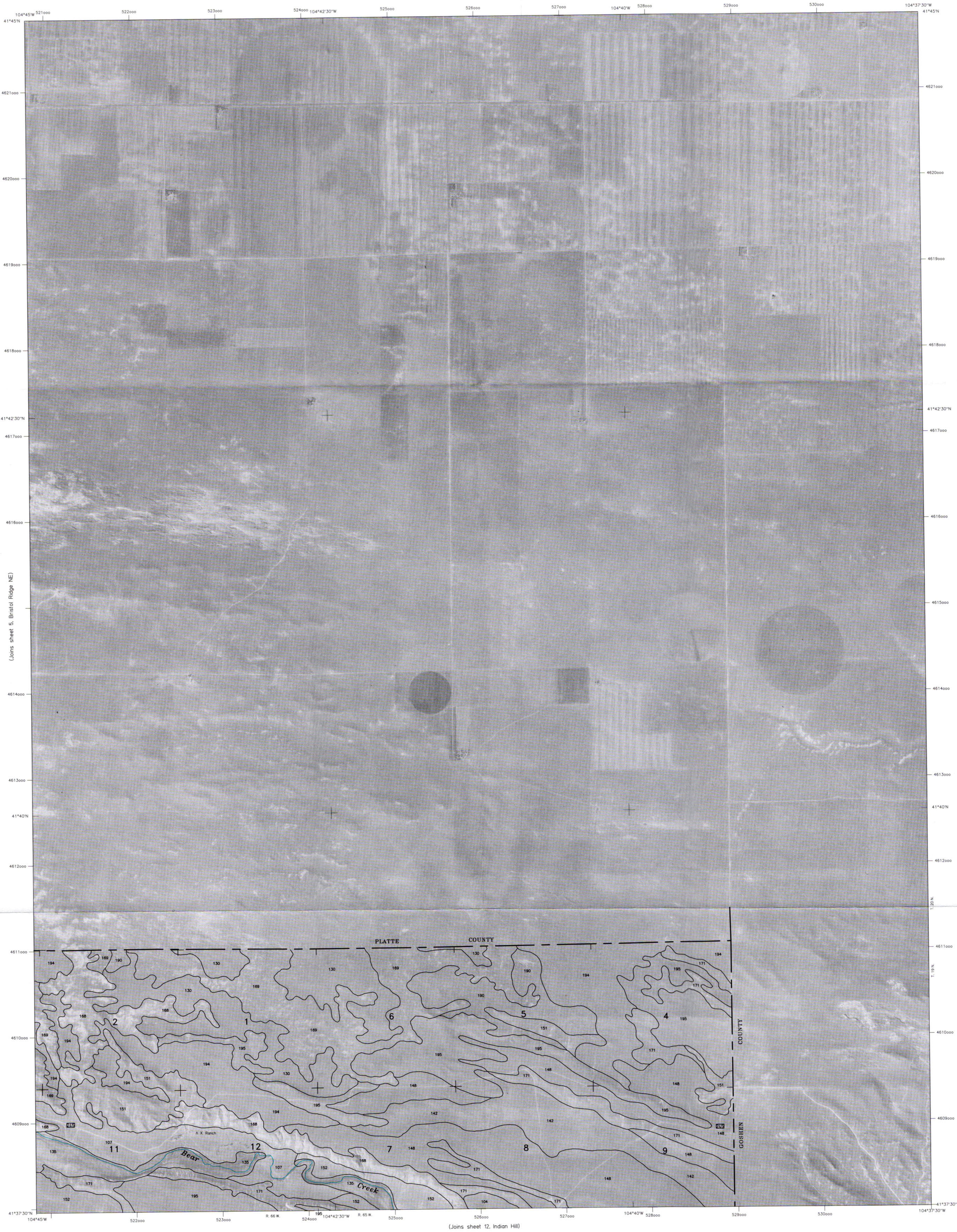
Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 5 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
BRISTOL RIDGE NE QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

N

SHEET NUMBER 6 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
C S RANCH QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER
Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

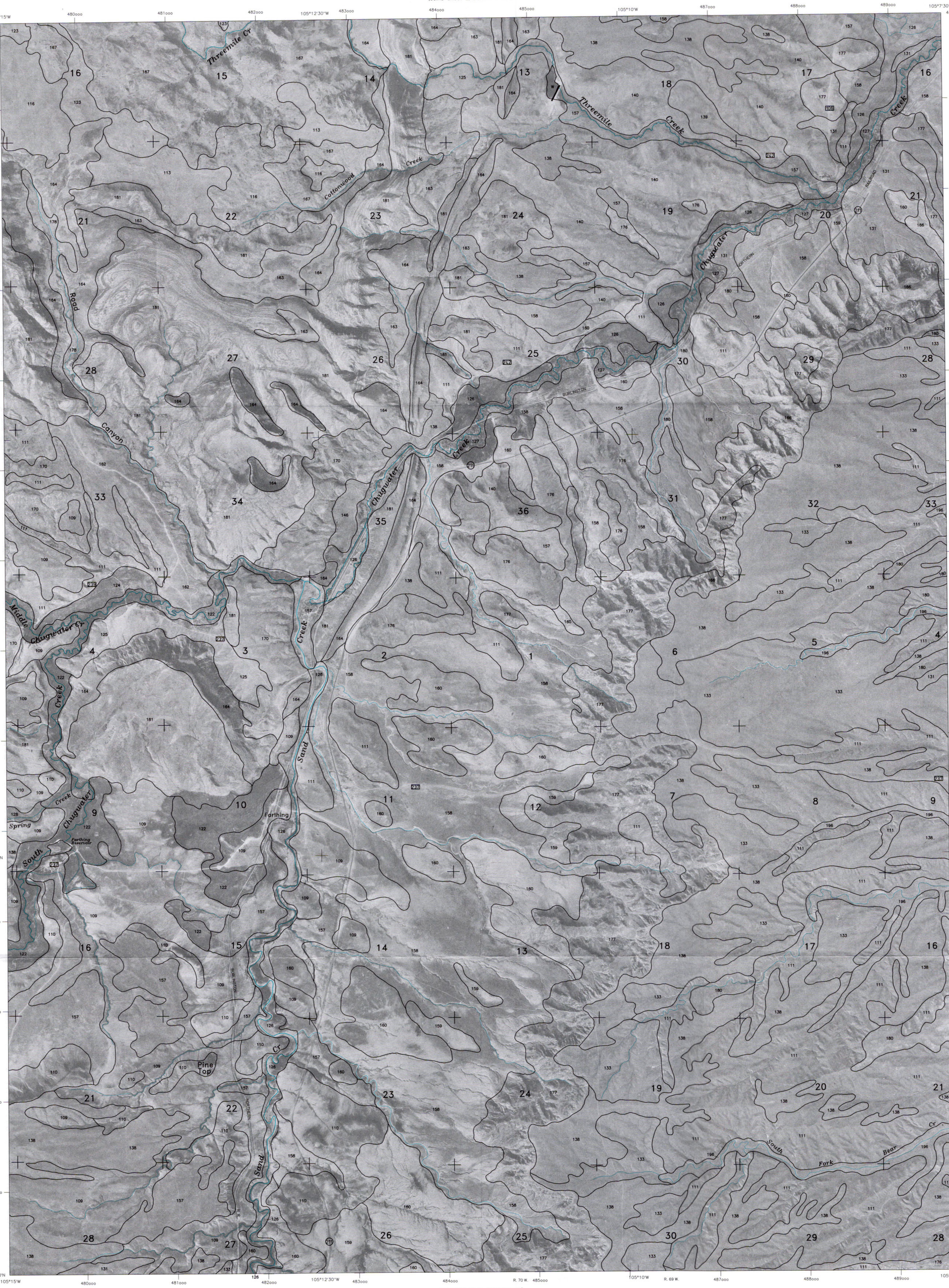
Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 7 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
GOAT MOUNTAIN QUADRANGLE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

(Joins sheet 2, Delano Ranch)

(Joins sheet 7, Goat Mountain)



(Joins sheet 9, Hirsig Ranch)

(Joins sheet 15, Horse Creek)

Scale 1:24000

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

SHEET NUMBER 8 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
FARTHING QUADRANGLE

(Joins sheet 3, McDonald Ranch)

(Joins sheet 8, Farthing)

(Joins sheet 10, Bristol Ridge)

(Joins sheet 16, Dereemer Ranch)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

Scale 1:24000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service, formerly Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 and 1979 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned. Digital soils data is available for this quadrangle.

Digital Data: UTM Coordinate System Zone: 13
Polyconic Projection
1927 North American Datum

SHEET NUMBER 9 OF 41
LARAMIE COUNTY, WESTERN PART, WYOMING
HIRSIG RANCH QUADRANGLE